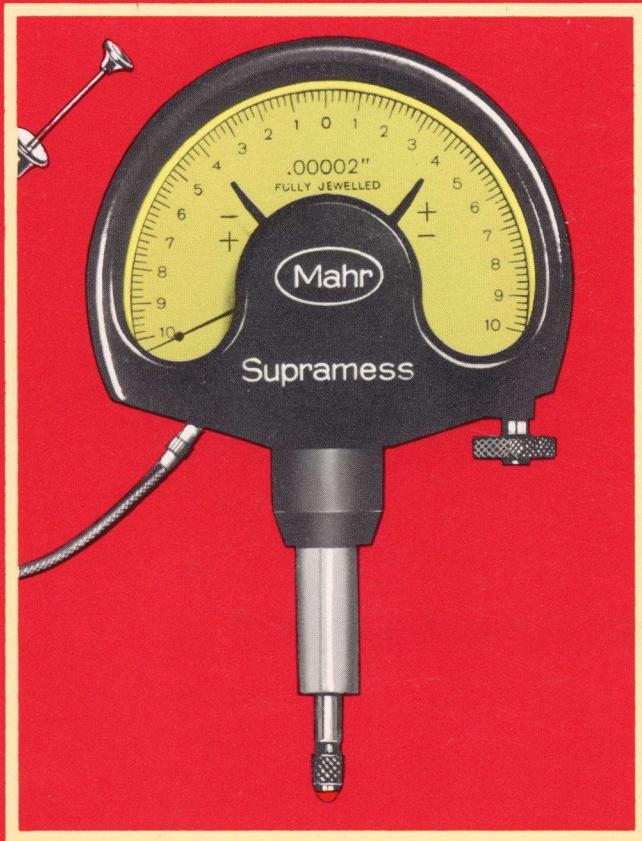


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# PRECISION Measuring Instruments



**MODERN GAGING METHODS  
FOR MODERN QUALITY CONTROL**

# Precision Measuring Instruments

## Modern Gaging Methods

through employment of **MAHR** indicating type gages

The increasing use of automatic equipment for assembly operations demands 100% inspection. Where formerly many customers would not complain too strenuously if they found one defective part in 100 parts purchased, some would object today vigorously if one defective part occurred in each 5000. In hand assembly operations defective parts may be discovered by an operator and thrown out, but in automatic equipment, the part may be assembled into the product.

Inspection time is seldom considered part of production cost. In mass production it must be held to a minimum through employment of time saving methods. Inspection of parts with fixed gages, with plug gages or snap gages for example, may be right for short runs or in production of single parts. In mass production this method is too time consuming to be practical. Furthermore, fixed gages are **subject to wear** in constant use and they do not show the position of the work **within** the tolerance limits. To meet the requirements for high speed measuring with maximum accuracy, **indicating type gages** alone are the answer. They permit a measuring result expressed in dimensional values, and the operation is independent of the measuring "feel" and pressure used by different persons. Speed of inspection is higher than with fixed gages, because Go and NoGo measuring is not separately performed.

Requirements for extremely close tolerances can be readily met by interchangeable Comparator Heads which are used instead of Dial Indicators. MAHR super-sensitive Precision Comparators read directly in 20 millionths, 50 millionths, tenths or  $\frac{1}{2}$  thousandths of an inch. They are instantly interchangeable to meet required tolerance specifications. These comparators employ a lever principle for their amplifying mechanism. Measuring motion of spindle is transmitted by means of a

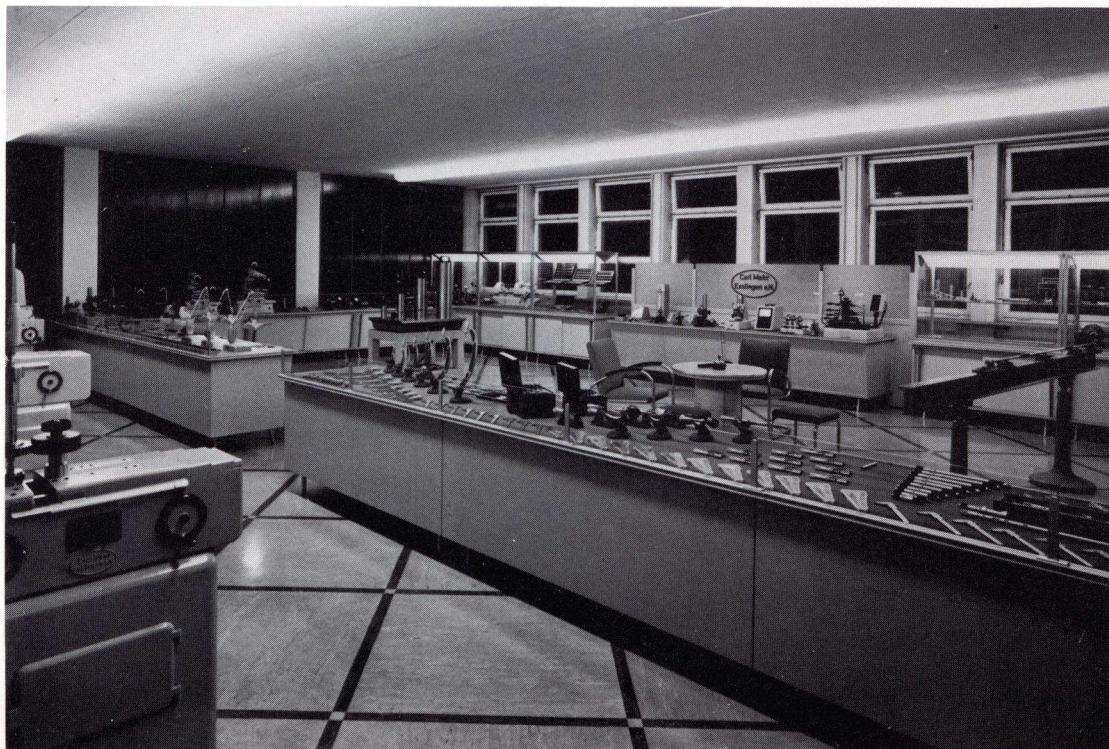
precision ball rolling along a precision lapped, plane sapphire surface. They are completely shockproof.

For large inspection runs a further increase in measuring speed and accuracy is possible through the use of **electric comparator** heads. Electric limit contacts may be set to the tolerance limits. When the work is gaged off-size, plus or minus contacts are closed causing a light in the signal attachment to flash whether the work is over- or undersized. The inspector must only observe the lights which tell him instantly whether the work is within tolerances (green light), undersize (red light) or oversize (white light). In addition, the actual measurement may be read on the dial. Multi-position inspection with electric comparators is simple to set up and tremendously fast and accurate. All signal light attachments are provided with a second socket for control connections which make further automation possible.

### SUMMARY:

The use of MAHR indicating type gages results in considerable savings of time and money and minimizes the cost of inspection. The measuring result can be read in numerical values, and the personal measuring feel of the operator has no influence on the result, assuring much greater reliability. Comparator heads reading in fractions of tenths of thousandths may be readily interchanged, and within seconds the gages can be equipped to read in the desired tolerances.

The gages can be set to zero quickly, and their measuring surfaces are practically not subject to wear. And, because of the relatively wide measuring range of each gage size, a much smaller number of gages are needed to do the job.



Showroom at Factory



### NO. 40SF Indicating Micrometer-Comparator,

0-1" range, reading in tenths. Make Go and NoGo gaging obsolete. Reduce each measurement to one operation. Detect out-of-round and taper.

**Fully jewelled**, one piece stainless steel spindle and screw. Anvils are heavily tungsten carbide tipped. Forged steel frame.

#### Specifications:

- No. 40SF 0-1" measuring capacity, in finished hardwood case
- No. 40SF metric, 0-25 mm measuring capacity, in finished hardwood case
- No. 41H Micrometer Stand
- No. 40SFB Indicating Micrometer with disc type anvils. Diameter of disc 1", measuring capacity 0-3/4", otherwise identical with No. 40SF. In finished hardwood case.

For larger sizes of Indicating Micrometers refer to page 4.



Repair and Spare Parts in stock.

#### Every Shop Needs One

A comparator for inspection of mass produced parts, screw machine products, ground pieces etc. The micrometer spindle and tolerance hands may be set to the required size. The locknut is used to firmly clamp the spindle without altering the setting. The anvils are opened by pressing the button on the side of the frame, allowing the work to be inserted and withdrawn without friction.

Uniform pressure is maintained while measuring. The indicating mechanism controls the measuring pressure, eliminating all uncertainties due to difference in the "feel" of individuals. Out-of-round, oval, taper conditions can be determined by rotating or sliding the work between the anvils while observing the readings of the indicator with an accuracy of 1/10,000".

#### A Right Hand Tool

Release button for moveable anvils on right hand side enables operator to hold tool the conventional way. NEW — Resetting to ZERO in seconds. Quick adjustable tolerance hands.

#### Convenient

No. 41H Micrometer Stand guards against body heat and frees both hands of operator.

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# INDICATING MICROMETER - COMPARATOR

LARGE SIZE Indicating Micrometers with removable indicator are available **up to 12" capacity.**

## No. 40T Indicating Micrometer

furnished with removable Precision Comparator "Millimess" No. 1003Z,\* reading in .000050", range of dial  $\pm .002"$ . Micrometer head reading in .0001".

The anvils are opened by pressing the button on the side of the frame, allowing the work to be inserted and withdrawn without friction. Sizes larger than 2" are equipped with a lifting lever instead of the button.

**Fully jewelled**, one piece stainless steel spindle and screw. Anvils are heavily tungsten carbide tipped. Forged steel frame.

### SPECIFICATIONS:

No. 40T range 0"-1" 1"-2" 2"-4" 4"-6"  
6"-8" 8"-10" 10"-12"

All sizes are furnished in finished hardwood case and **include** setting standard.

No. 41H Micrometer Stand optionally available.

METRIC sizes available.

For **thread measuring** or special applications, these micrometers can be furnished with bores in anvil and spindle for inserting interchangeable anvils. (see page 34). Use catalog No. 40TZ.

Thread Measuring Wires with Holders are available to be adapted to spindle and anvil of these micrometers. (Refer to page 40). Request information.

\*On request, we can furnish all sizes of No. 40T Indicating Micrometers with "Compramess" No. 500Z Comparator, reading in .0001", range of dial  $\pm .005"$ , at no additional cost. Specify "with Compramess" in order.

## NEW



## SUPER-INDICATING MICROMETER

readings directly in **20 millionths** of an inch.

## No. 40TS Indicating Micrometer

furnished with removable Precision Comparator "Supramess" No. 1003SZ, reading in .000020", range of dial  $\pm .001"$ . Micrometer head reading in .0001".

The anvils are opened by pressing the button on the side of the frame, allowing the work to be inserted and withdrawn without friction.

**Fully jewelled**, one piece stainless steel spindle and screw. Anvils are heavily tungsten carbide tipped. Forged steel frame.

### SPECIFICATIONS:

No. 40TS range 0"-1" 1"-2"

All sizes are furnished in finished hardwood case but **without** setting standard.

No. 41H Micrometer Stand optionally available.

METRIC sizes available.



Repair and Spare Parts in stock.

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## BENCH MICROMETER

WITH INTERCHANGEABLE MEASURING ANVILS

## No. 40H Precision Bench Micrometer

for small and difficult to measure parts. Measuring anvils are interchangeable. It features a heavy, stable base, thimble diameter of  $1\frac{3}{4}$ ", throat depth of 1.280". The heavy micrometer head has a **NON-ROTATING** spindle and reads directly in .0001". A **locknut** is provided to firmly clamp the spindle.

## SPECIFICATIONS:

**No. 40H, 0"-1"** range, reading directly in .0001". Price includes 1 set of anvils (select from diagram on bottom of this page, except tungsten carbide tipped anvils) and black hardwood case, which has spaces for all interchangeable anvils. Additional sets of anvils and tungsten carbide tipped anvils can be purchased extra.

METRIC available.

## No. 40HF Indicating Bench Micrometer

the ideal inspection aid for small and delicate parts for the toolmaking, instrument making, watch making and electronic field. Measuring anvils are interchangeable. Heavy stable base, thimble diameter of  $1\frac{3}{4}$ ", throat depth of 1.280". The heavy micrometer head has a **NON-ROTATING** spindle and reads **directly** in .0001". A **locknut** is provided to firmly clamp the spindle. A thumb lever built into the base permits rapid retraction of the anvil for inserting and withdrawing the work. Instant zero adjustment. Tolerance hands are outside of dial. **Measuring range is 0"-1"**.

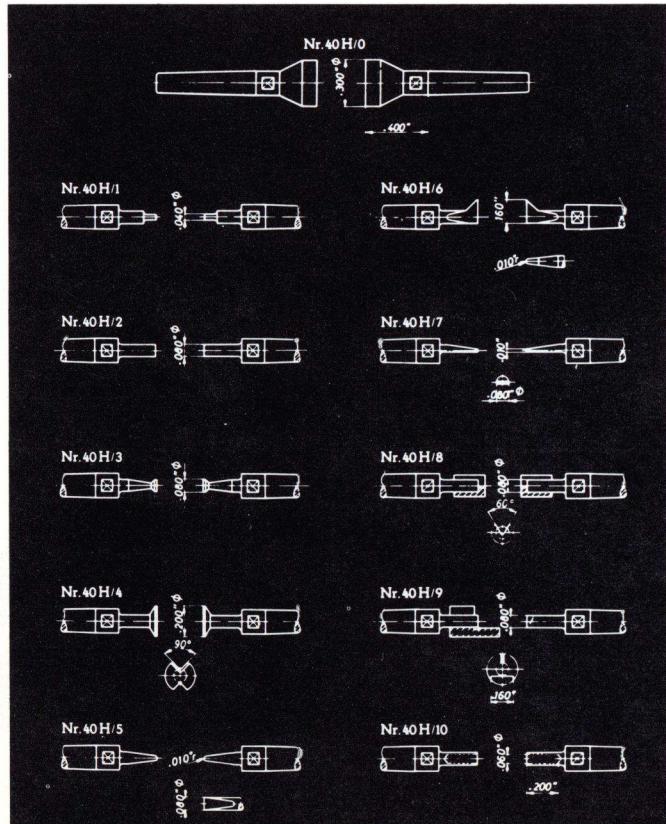
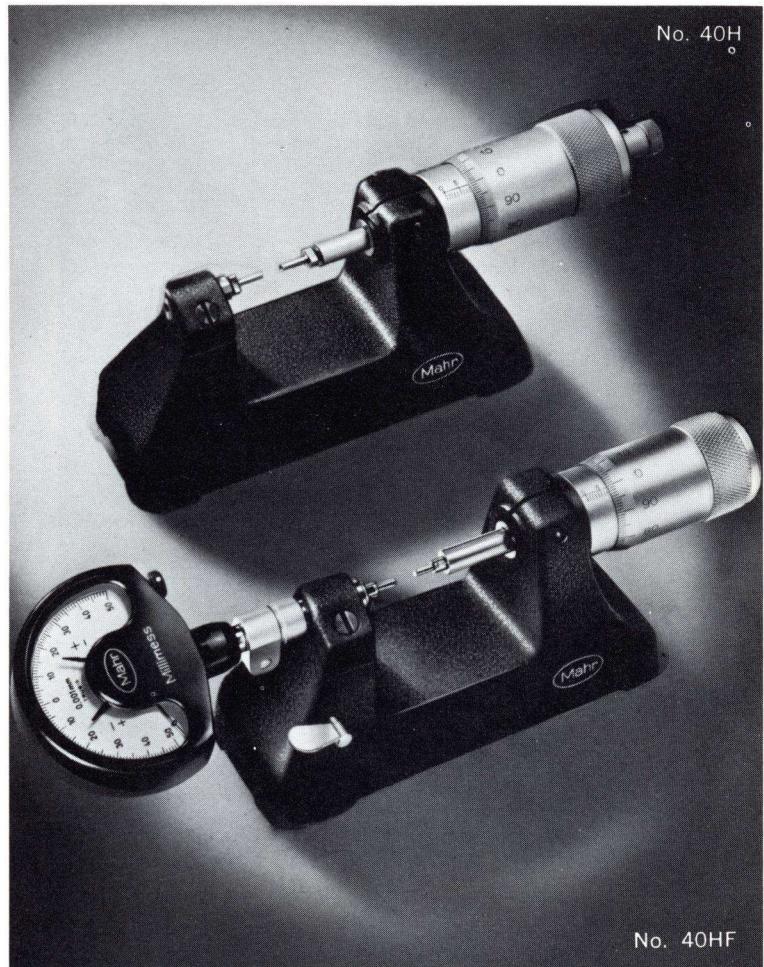
## SPECIFICATIONS:

No. 40HF, 0"-1" range equipped with "Millimess" No. 1003Z Comparator, reading in .000050" or

equipped with "Supramess" No. 1003SZ Comparator, reading in .000020".

Price includes 1 set of anvils (select from diagram on bottom of this page, except tungsten carbide anvils) and black hardwood case, which has spaces for all interchangeable anvils. Additional sets of anvils and tungsten carbide tipped anvils can be purchased extra.

METRIC available.



## Interchangeable Measuring Anvils

Spindle and anvil of the No. 40H Precision Bench Micrometer and the No. 40HF Indicating Bench Micrometer have conical bores which are holding the interchangeable measuring anvils firmly and precisely centered by their tapered shanks. Eleven pairs of anvils of various shapes are carried in stock from which a suitable form may be selected for the work to be checked.

Anvils No. 40 H/0, plane measuring faces .300" diameter

Anvils No. 40 H/1, plane pin anvil, .040" diameter

Anvils No. 40 H/2, plane pin anvil, .080" diameter

Anvils No. 40 H/3, disc shaped anvil, .080" diameter

Anvils No. 40 H/4, disc shaped anvil, with V-notch, .200" diameter

Anvils No. 40 H/5, blade anvil, .080" width

Anvils No. 40 H/6, off-set blade, .160" height

Anvils No. 40 H/7, off-set blade .080" width

Anvils No. 40 H/8, same as No. 40 H/2, with slip-on V-block bushings for supporting the part to be measured

Anvils No. 40 H/9, same as No. 40 H/2, with slip-on right angle work support

Anvils No. 40 H/10, with clearance bore, .200" bore depth, .060" bore diameter

Anvils No. 40H/0, No. 40H/1 and No. 40H/2 can be furnished with **TUNGSTEN CARBIDE** faces.

We recommend only small diameter size anvils for the above Bench Micrometers.

For mass inspection, it is recommended to use MAHR **Electric Comparators**, instead of mechanical comparators, as shown with above Indicating Bench Micrometer. MAHR Electric Comparators provide reading of gaging result relative to tolerances on the Light Indicator and of the deviation from the nominal size on the scale of the Comparator. Refer to pages 12 to 15.

## INDICATING SNAP GAGE

## No. 840F Adjustable Indicating Snap Gage

With super-sensitive comparator gaging heads, reading in 20 millionths, 50 millionths, tenths or  $\frac{1}{2}$  thousandth of an inch.

MAHR Indicating Snap Gages eliminate operator's "feel." One may determine at a glance whether work is within tolerance limits. Just set the limit hands on the dial, retract the moveable anvil with one finger by means of lever in back of gage (see fig. 2), and let it "snap." The dial will show the exact amount of material left to be removed.

A single MAHR Indicating Snap Gage replaces a whole set of fixed snap gages because the individual indicating snap gage has an extremely wide range. Five frames cover a range from 0" to 8". These five MAHR Indicating Snap Gages replace 24 fixed gages ordinarily needed to cover this range.

*Here are some outstanding features of MAHR Indicating Snap Gages:*

Make Go and NoGo gaging obsolete

Reduce each measurement to one operation

Not subject to individual's touch or skill

Tell within millionths how far work is from limit zone

Detect out-of-round and taper

Easy to set and operate



## CONSTRUCTION:

Drop forged steel frame with thermal insulating handles. Moveable spindle assures parallelism of measuring faces at all settings. Tungsten carbide tipped anvils. Observe convenient lever on back of frame (see fig. 2) for rapid retraction of moveable anvil. The absence of force minimizes wear of measuring surfaces and eliminates feel of operator. Ideal for work on cylindrical grinder. Adjustable tolerance hands. Adjustable back stop for correct diametrical location. Easy to set with gage blocks or plug gages.

MAHR super-sensitive comparator gaging heads, reading in 20 millionths, 50 millionths, tenths or  $\frac{1}{2}$  thousandths of an inch are instantly interchangeable.

## SPECIFICATIONS:

No. 840F, range 0"-1" 1"-2 $\frac{3}{8}$ " 2"-4" 4"-6" 6"-8"

All sizes are furnished in black hardwood cases but without comparator gaging head.

Select interchangeable comparator gaging head from page 8 and 9. If desired for METRIC, select gaging head graduated in millimeters.

Indicating Snap Gages for the checking of threads, grooves, slots, recesses, key ways, splines and hard-to-measure surfaces are available with interchangeable measuring anvils. Refer to page 36-37.



Repair and Spare Parts in stock.



Fig. 2

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## INDICATING SNAP GAGE

## No. 888 Adjustable Indicating Snap Gage

With super-sensitive comparator gaging heads, reading in 20 millionths, 50 millionths, tenths or  $\frac{1}{2}$  thousandth of an inch.

## CONSTRUCTION:

Identical with No. 840F style, but with **fixed** anvils as illustrated, tungsten carbide tipped. Here is an excellent comparator for the accurate checking of form tools, lands, centering beads, shallow hubs and especially for measurements of tooth thickness on spur gears and helical gears. The special measuring jaws extend downward and are tungsten carbide faced, precision ground and lapped and adjusted for maximum parallelism. The moveable anvil, responding to a retracting lever located on the back of the frame, transfers its movement to the comparator head and permits a measuring result independent of the measuring "feel" and pressure used by different persons.

## SPECIFICATIONS:

No. 888, range: 0"-1 $\frac{1}{2}$ " 1 $\frac{1}{2}$ "-3" 3"-5" 5"-7"

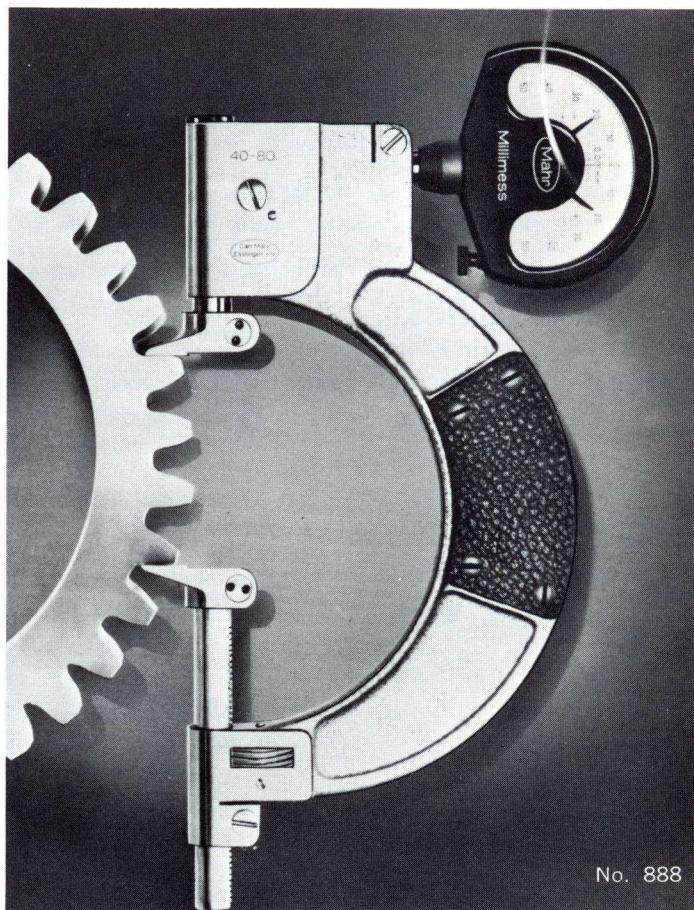
All sizes are furnished in black hardwood cases but without comparator gaging heads.

Select interchangeable comparator gaging head from page 8 and 9.

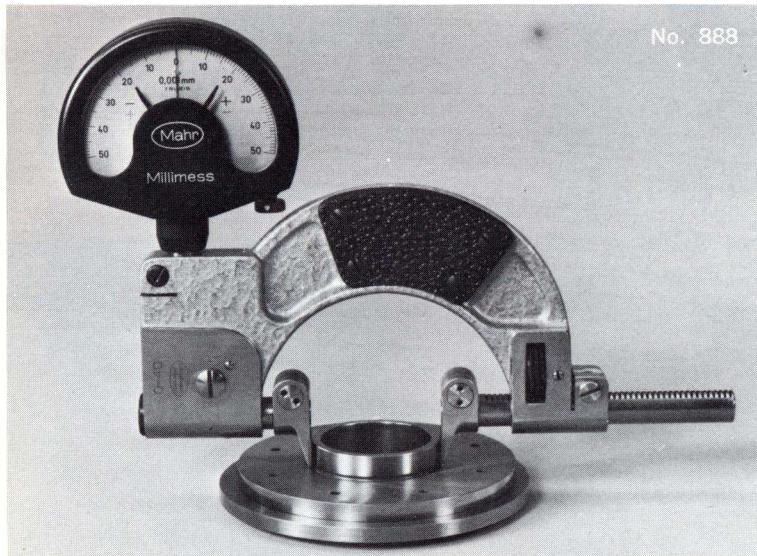
If desired for METRIC, select gaging head graduated in millimeters.

For larger ranges refer to No. 888M, on bottom of this page.

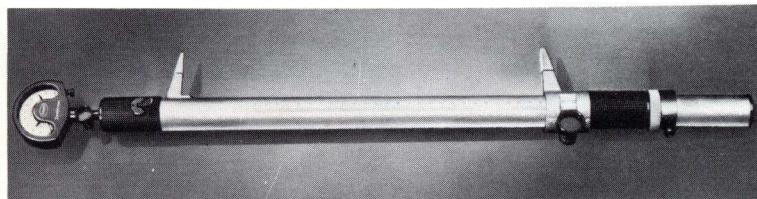
The special measuring jaws can also be furnished extending forward or backward, to order. They are **fixed** and cannot be adjusted except at factory.



No. 888



No. 888



No. 888M

## No. 888M Indicating Snap Gage

(illustrated on Bottom of this page)

With super-sensitive comparator gaging heads, reading in 20 millionths, 50 millionths, tenths or  $\frac{1}{2}$  thousandth of an inch. Measuring Capacity 2" to 16".

## CONSTRUCTION:

With fixed anvils, tungsten carbide tipped. A comparator for the accurate measurement of tooth thickness on straight and helical gears. The special measuring jaws are carbide faced, precision ground and lapped and adjusted for maximum parallelism. The moveable anvil, responding to a retracting lever, transfers its movements to the comparator head and permits a measuring result expressed in dimensional values. The operation is independent of the measuring "feel" and pressure used by different persons.

## SPECIFICATIONS:

No. 888M, measuring capacity 2" to 16".

Furnished in black hardwood case but without comparator gaging head.

Select interchangeable gaging heads from page 8 and 9.

If desired for METRIC, select gaging head in Millimeters.



Repair and Spare Parts in stock.

# PRECISION COMPARATORS

Reading directly in

## 20 MILLIONTHS

Range of Dial  $\pm .001"$

Accuracy over entire range  $\pm .000010"$

Fully Jewelled,  
furnished with ruby ball contact tip

### SUPRAMESS No. 1003SZ

Graduations	.000020"
Range of total scale	$\pm .001"$
Width of single division	.045"
Accuracy of total scale	$\pm .000010"$
Overttravel	.110"
Measuring Pressure	3½ oz.
Weight	3½ oz.

METRIC graduations available, reading in  $.5 \mu\text{m}$ .



## 50 MILLIONTHS

Range of Dial  $\pm .002"$

Accuracy over entire range  $\pm .000020"$

Fully Jewelled,  
furnished with steel ball contact tip

### MILLIMESS No. 1003Z

Graduations	.000050"
Range of total scale	$\pm .002"$
Width of single division	.045"
Accuracy of total scale	$\pm .000020"$
Overttravel	.110"
Measuring Pressure	3½ oz.
Weight	3½ oz.

METRIC graduations available, reading in  $.001 \text{ mm}$ .



## Standard Equipment

for all MAHR Precision Comparators:

Clear plastic case (for storing)

Ball contact tip (as specified)

Cable release (for lifting of feeler point  
by remote control)

3/8" bushing (for AGD)



## TENTHS

Range of Dial  $\pm .005"$

Accuracy over entire range  $\pm .0001"$

Fully Jewelled  
furnished with steel ball contact tip

## Compramess No. 500Z

Graduations	.0001"
Range of total scale	$\pm .005"$
Width of single division	.036"
Accuracy of total scale	$\pm .0001"$
Overttravel	.100"
Measuring pressure	3½ oz.
Weight	3½ oz.

METRIC graduations available, reading in  $.005 \text{ mm}$ .

## 1/2 THOUSANDTHS

Range of Dial  $\pm .010"$

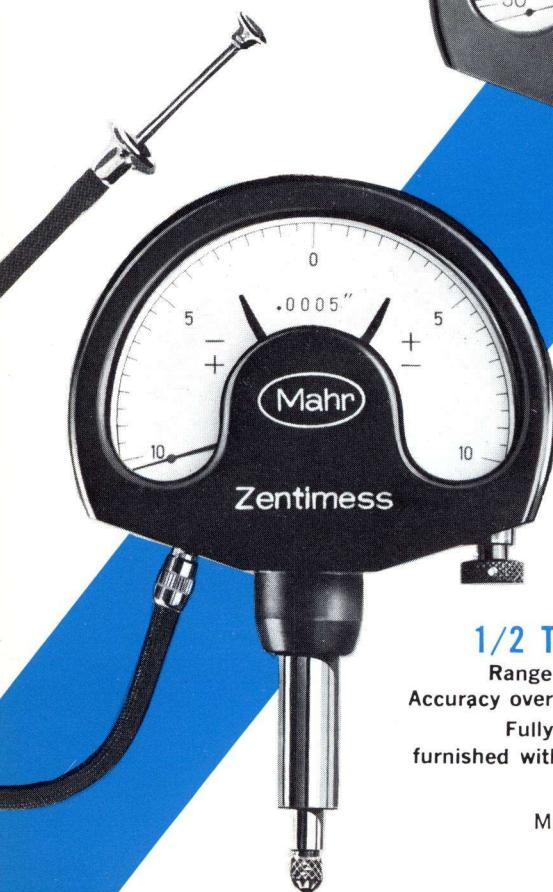
Accuracy over entire range  $\pm .0002"$

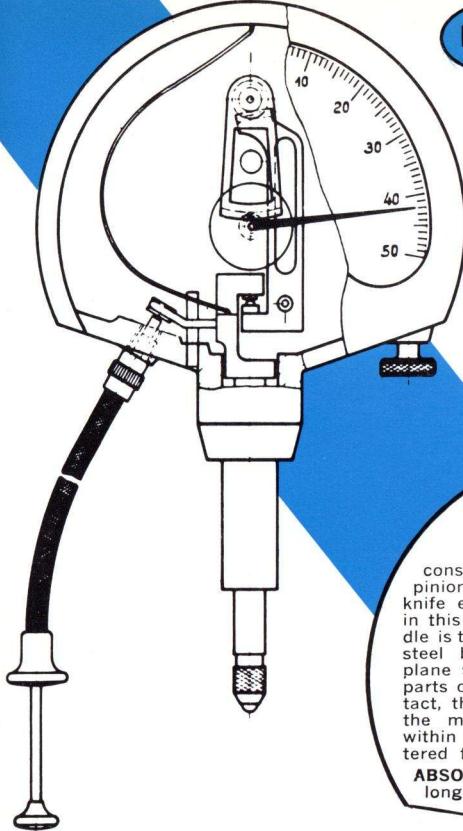
Fully shockproof,  
furnished with steel ball contact tip

### ZENTIMESS No. 1002

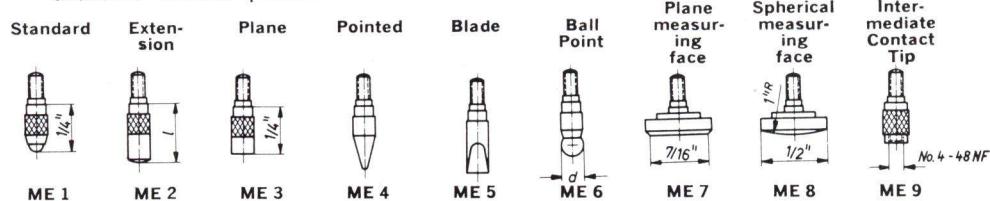
Graduations	.0005"
Range of total scale	$\pm .010"$
Width of single division	.090"
Accuracy of total scale	$\pm .0002"$
Overttravel	.100"
Measuring Pressure	3½ oz.
Weight	3½ oz.

METRIC graduations available, reading in  $.01 \text{ mm}$ .





have a threaded base (2.6 mm) and are interchangeable. Here is a variety of available contact points:



The intermediate contact tip ME 9 has mm thread on one side and 4-48 NF on other side, for mounting AGD-contact tips. ME 1 is optionally available with ruby ball instead of steel ball. Specify LENGTH when ordering ME2 and ME3.

#### Special Features THE AMPLIFYING MECHANISM

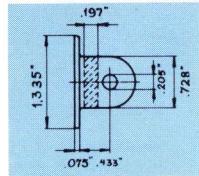
consists of a lever, a gear segment, a pinion and a pointer. The unreliable knife edge suspension has been avoided in this design. Measuring motion of spindle is transmitted by means of a precision steel ball rolling over a highly lapped plane sapphire surface. Since all moving parts of the linkage are in preloaded contact, there is no play or back lash. Thus the measuring accuracy is maintained within a fraction of one graduation, unaltered for the lifetime of the instrument.

**ABSOLUTELY SHOCKPROOF** insuring long life with unchanging accuracy.

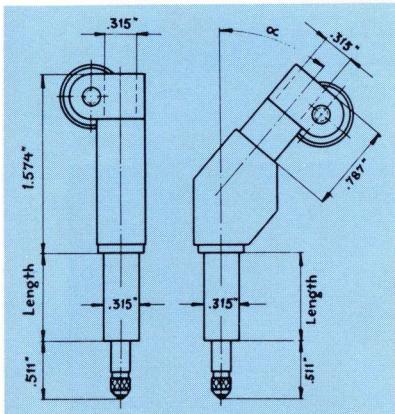
#### Optionally Available

If the mounting of the Comparator on its shank is not desired, we can furnish a

##### CENTER LUG BACK



which may be cemented on the flat back of the Precision Comparator. In the same manner, any standard AGD-Indicator back can readily be fastened to MAHR Precision Comparator.



#### No. 813H Special Holder

for Precision Comparators and Dial Indicators

Diameter of mounting shank .315"  
Maximum travel of measuring spindle .120"

Most practical for mounting of Indicators for special gaging applications. Available as follows:

No. 813Hg Straight Holders  
No. 813Hw Angular Holders

ME 1 is furnished as standard contact point.

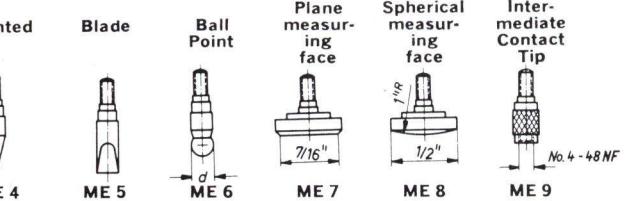
Other contact points optionally available.

Length L	1"	2"	3"
Angle $\alpha$	45°		
	60°		
	90°		

Length L and angle  $\alpha$  should be stated when ordering.

#### Contact Points

have a threaded base (2.6 mm) and are interchangeable. Here is a variety of available contact points:



#### Optional Accessories for MAHR Precision Comparators:

Center Lug Back

Plastic Splash Guard

Drip-Water Proof Construction

Ruby Ball Contact Tip

Turn knob for raising of measuring spindle instead of cable release

Rubber Boot for protecting spindle against water and dust

#### Special Features

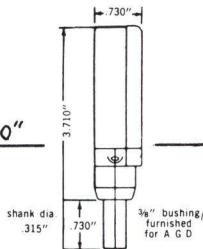
**OVERTRAVEL** of approx. .110" beyond scale range, permitting measuring of grooves, etc., and preventing damage to instrument.

**CABLE RELEASE.** The feeler point is lifted by means of a cable release which protects the comparator from heat of hand, unequal pressure and vibration.

**FINE ADJUSTMENT** of the hand is possible over the entire range when the measuring spindle is under pressure.

**TOLERANCE HANDS.** Two tolerance hands instantly adjustable to any decided plus and minus tolerances.

#### PRINCIPAL DIMENSIONS



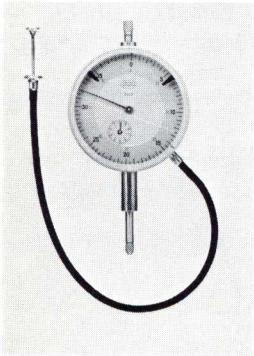
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## SHOCKPROOF DIAL INDICATORS

## No. 811 ST Shockproof Dial Indicators

ALL STEEL construction. Spindle and mounting shaft are made of stainless, hardened steel. Our unique design, illustrated on bottom of this page, makes our indicators completely shockproof and insures long life with unchanging accuracy. Equalizing lever assures uniform measuring pressure over the entire range.

One revolution of the large hand of the No. 811ST corresponds to .040". The dial is divided into 40 parts. The long lines indicate .001"; by a subdivision .0005" can be read directly and still smaller values can be estimated. The second small dial hand counts the revolutions of the big hand. The measuring range is .400".

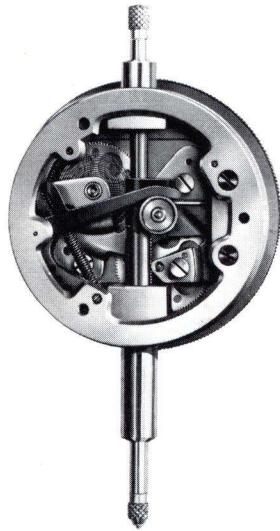


The Dial Indicators are furnished with a cable release, for which a threaded opening is provided at right bottom in the housing. This opening is plugged by a screw to prevent penetration of dust and moisture, when cable release is not in use.

A plastic splash guard is furnished as standard accessory. This front cover is made of transparent, unbreakable plastic. It prevents drip water, oil and dirt from entering and protects window and bezel against physical damage.

These indicators are ideal for O.E.M. use.

**Construction of Dial Indicator No. 810/811 ST and its most important features:**

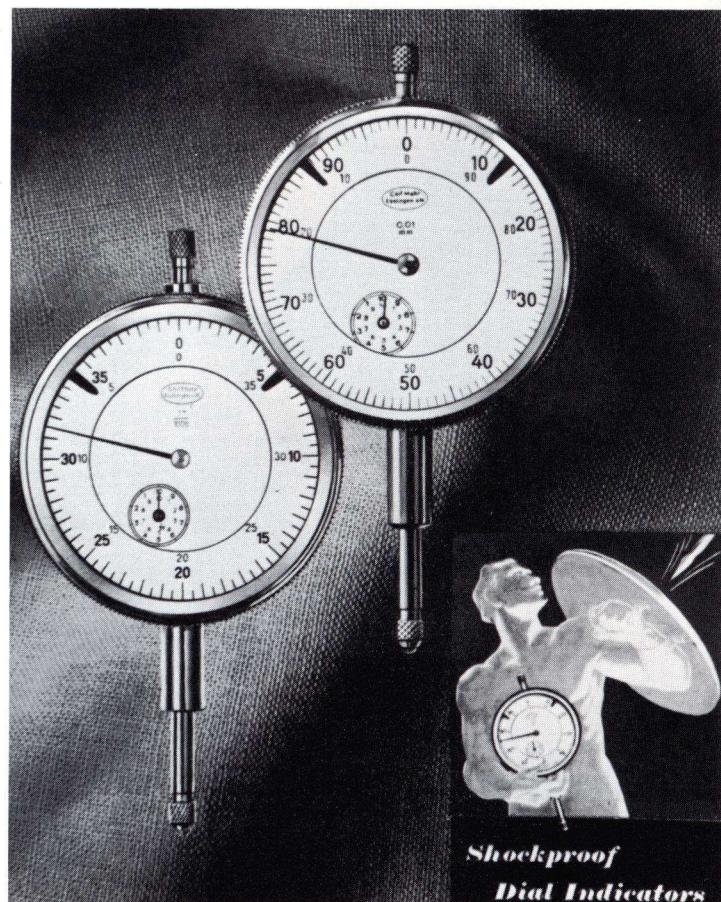


**Switch Lever** permits setting of measuring pressure to 65 gram =  $2\frac{1}{2}$  oz. or 100 gram =  $3\frac{1}{2}$  oz.

**Floating rack** sleeve shields mechanism from even the heaviest shocks.

**Lapped gear rack** of hardened steel and precision gearing in mechanism guarantee constant high measuring accuracy.

**Dull Chromed** steel housing one-piece with mounting shaft make the dial indicator durable and insensitive.



**Specifications:** No. 811ST reading in .0005" measuring range .400"

No. 810ST reading in 1/100 mm measuring range 10 mm dial diameter 2 1/4" shank diameter .315"

With adjustable tolerance markers.

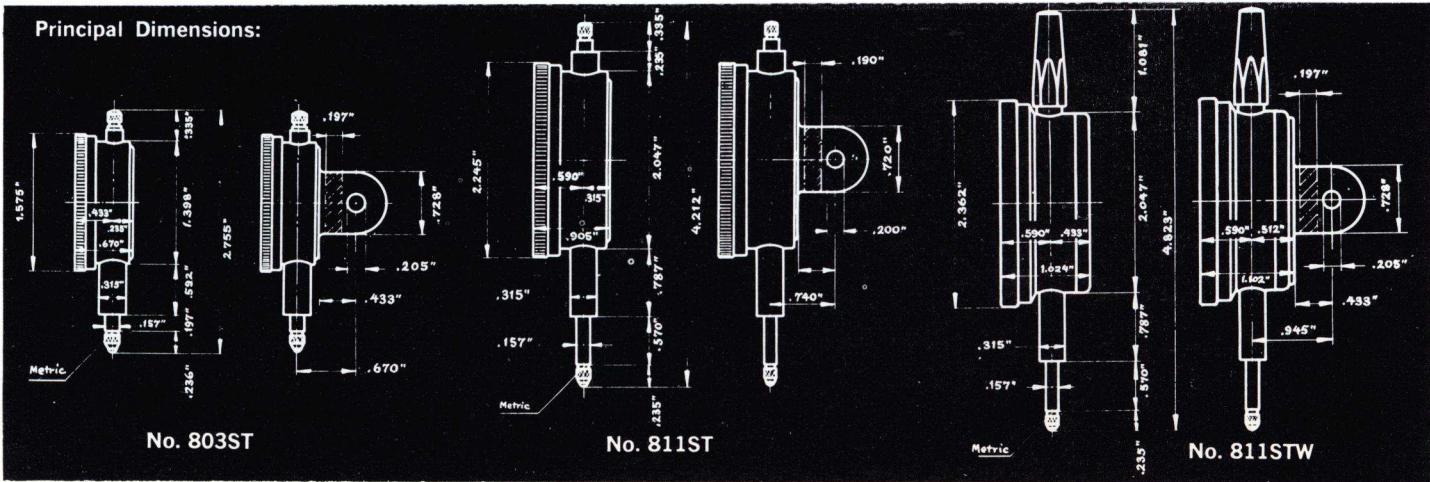
Furnished in clear plastic case with ME 1 standard ball contact tip, cable release for lifting of feeler point by remote control, with plastic splash guard and  $\frac{3}{8}$ " bushing for AGD. The indicator has a flat back.

**Center Lug Backs** optionally available.

Straight and angular holders for special mounting of Dial Indicators, refer to page 9.

**Contact Points** have a threaded base and are interchangeable. Refer to page 9 for Standard and other available contact points.

**Principal Dimensions:**



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# WATERPROOF & SHOCKPROOF DIAL INDICATORS

## No. 803STZ Shockproof Small Dial Indicators

They are most convenient and light in weight and of highest accuracy. Particularly suitable for small measuring instruments. Shockproof mechanism protects the gear train from damage when jolting the spindle.

Sturdy housing assures stable position of mechanism and mounting shaft. Spindle and mounting shaft are made of **stainless, hardened steel**.

One revolution of the pointer corresponds to  $.020''$ . The dial is divided into 40 parts. The long division lines indicate  $.001''$ , the short one  $.0005''$ . Total measuring range is  $.120''$ .

**These indicators are ideal for O.E.M. use.**

### Specifications:

No. 803STZ reading in  $.0005''$   
measuring range  $.120''$   
with adjustable tolerance markers }  
No. 803ST reading in  $1/100$  mm  
measuring range 3 mm  
with adjustable tolerance markers }

dial dia.  $1\frac{1}{16}$ "  
shank dia.  $.315''$

Furnished in clear plastic case with ME 1 standard ball contact tip, with  $\frac{3}{8}$ " bushing for AGD. The indicator has a flat back. Center Lug Back optionally available.

The above Small Dial Indicators can now be furnished **drip-waterproof and shockproof**. A removable protective cap at the upper end of the spindle, as well as a transparent cover placed over the bezel, safeguard the dial indicator from penetration of dripwater, prolonging life of instrument.

### Specifications:

No. 803STWZ reading in  $.0005''$   
measuring range  $.120''$   
with adjustable tolerance markers }  
No. 803STW reading in  $1/100$  mm  
measuring range 3 mm  
with adjustable tolerance markers }

dial dia.  $1\frac{1}{16}$ "  
shank dia.  $.315''$

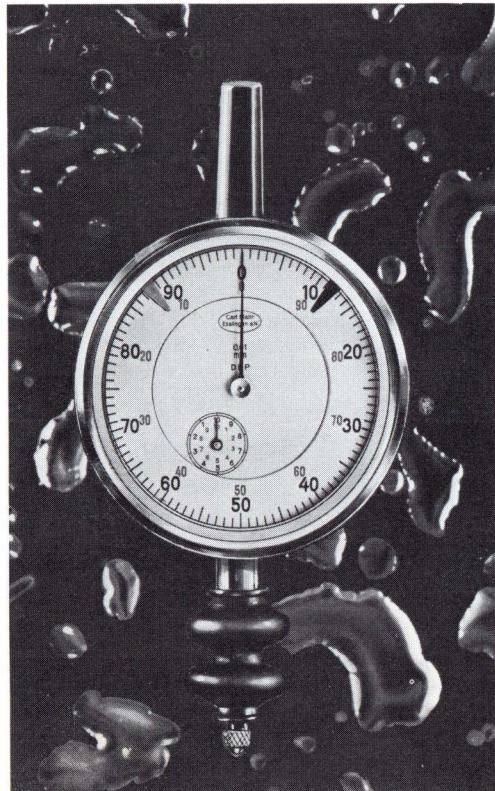
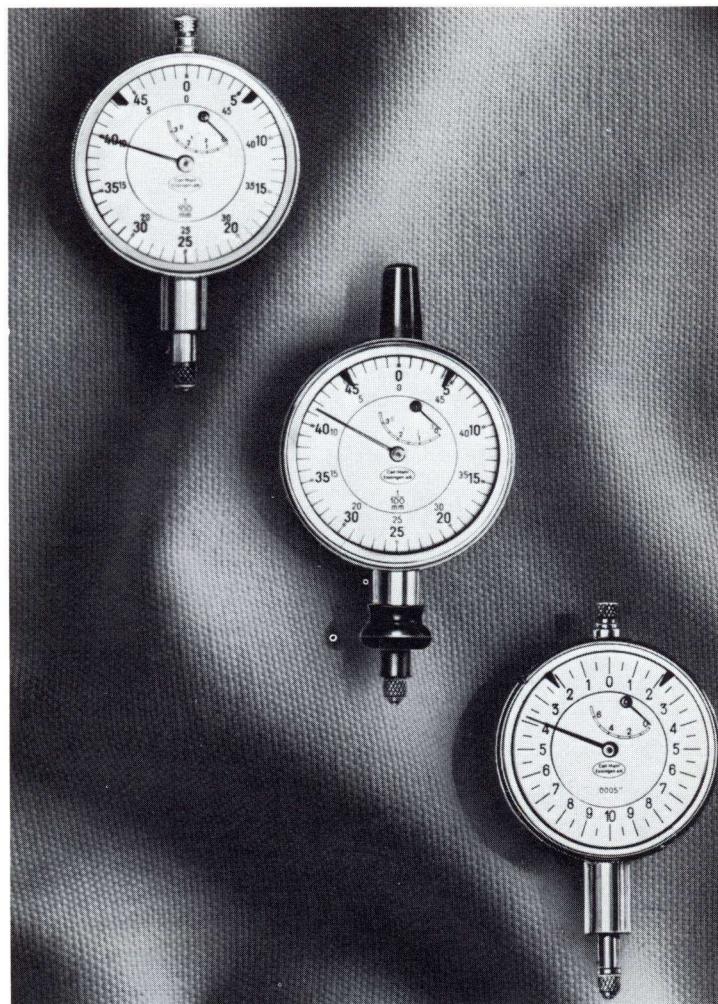
Furnished in clear plastic case with ME 1 standard ball contact tip, with  $\frac{3}{8}$ " bushing for AGD. The indicator has a flat back. Center Lug Back optionally available.

Extra Contact Points, refer to page 9.

No. 803ST

No. 803STW

No. 803STZ



## No. 811 STW Water and Oilproof, Shockproof Dial Indicator

This model is basically the same indicator as our No. 811ST (on page 10) but has **water-tight construction**. Absolutely protected against the entrance of moisture and dirt, this indicator can be used where it is exposed to cutting fluids and abrasive dust.

Like all other MAHR Dial Indicators, they are **SHOCK-PROOF**. Satin chrome finish protects the case against corrosion. Measuring spindle and shank are made of stainless steel.

**NEW:** Fine adjustment on this model is made by turning the knurled knob of stem cap. Zero always remains at 12 o'clock position. Tolerance hands are adjustable.

### Specifications:

No. 811STW reading in  $.0005''$   
total range  $.400''$  }  
No. 810STW reading in  $1/100$  mm  
total range 10 mm }  
dial diameter  $2\frac{1}{4}$ "  
shank diameter  $.315''$

Furnished in clear plastic case with ME 1 standard ball contact tip with  $\frac{3}{8}$ " bushing for AGD. The indicator has a flat back.

Center Lug Back optionally available.

Extra Contact Points, refer to page 9.

Request Repair Parts List with prices



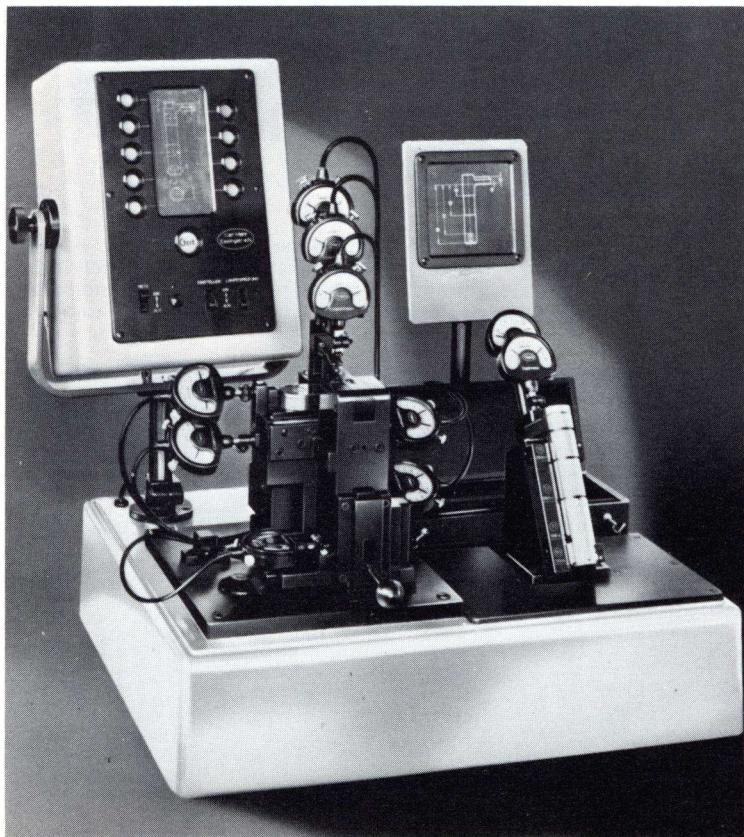
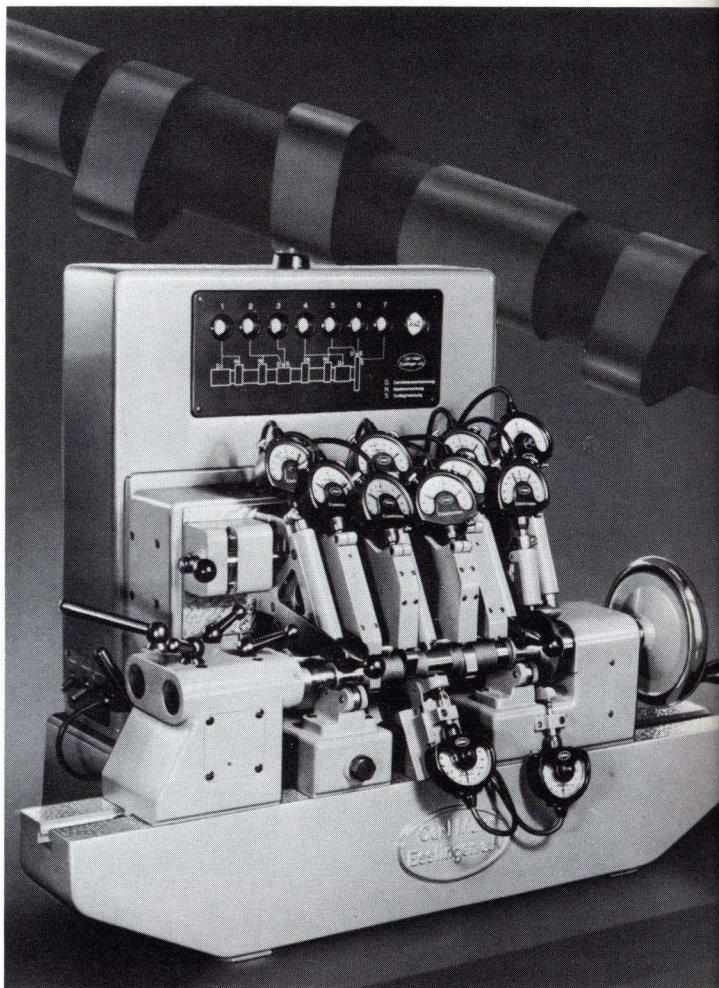
# ELECTRIC COMPARATORS

MAHR Precision Comparators with electric limit contacts indicating by signal light are the answer for RAPID inspection at CLOSEST tolerances.

For fast, effortless inspection of present-day tolerances and for the employment of automatic devices guided by the gaging result, ELECTRICITY is successfully used in transforming ordinary mechanical comparator gages into gaging units that indicate the passing of tolerances by flashing lights. Electric limit contacts built into the gaging unit will act with a finer discrimination than ordinary dial indicators, and off-size conditions can be detected within 10 millionths of an inch accurately and instantly.

In addition to superior accuracy, the electric comparator is FASTER than the usual mechanical indicating type gage since the eye perceives the signal lamps much more quickly. The human reaction to accepting or rejecting a workpiece is much more rapid under the stimulus of the flash of the light.

The signal light attachment provides a second socket for control connections, and makes further automation possible. Automatic controlling devices may be attached to this outlet. For instance, an acoustic signal may be sounded, whereby blind persons may be employed as inspectors. Or changes in dimensions beyond tolerance limits may be announced acoustically in comparators checking running work which is not observed continuously. Small parts may be segregated according to gaging results through switches controlled by the electric limit contacts, and the work guided into various sorting channels.



By installing auxiliary relays in the control circuit, it is possible to use heavier devices with a larger electric load, such as one that stops a machine whenever the work is gaged off-size by the comparator. A cylindrical grinder with an automatic device controlled by an "Elmillimess" electric comparator will stop the movement of the table, the turning of the workpiece and the flow of the coolant, and switches on the reverse movement of the grinding block as soon as the correct finished position is reached. Likewise an automatic control is effected in an internal grinder by measuring the position of the grinding spindle with the gaging unit, whereby the dimension of the bore is obtained indirectly.

Electric Comparators can be used in a variety of multiple installations, with a number of gaging stations connected to a signal light attachment, having a common O.K. light but separate plus and minus lights for each gaging station.

Electric Comparators may also be used as the basis for production statistics, with electric counters connected to the control outlet. In most cases two counters are attached: one for the total number of pieces checked, the other for the number of pieces accepted. The gaging unit thus serves as quality controlling device, without any extra installations beside the counters, saving the cost of an entire department.

An outstanding advantage of MAHR Electric Comparators Elmillimess and Elzentimess is that in addition to reading of Go and NoGo by lights, one can actually read at all times the ABSOLUTE dimensions FROM THE DIAL of the comparator.

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## ELECTRIC COMPARATORS

## No. 840S Grinding Gage

for use with cylindrical grinders for continuous precision measurements during grinding operations.

Measuring anvil carbide tipped.

Measuring range .200" to 4.800".

## Specifications:

No. 840S, range .200" to 4.800" (without electric or mechanical comparator).

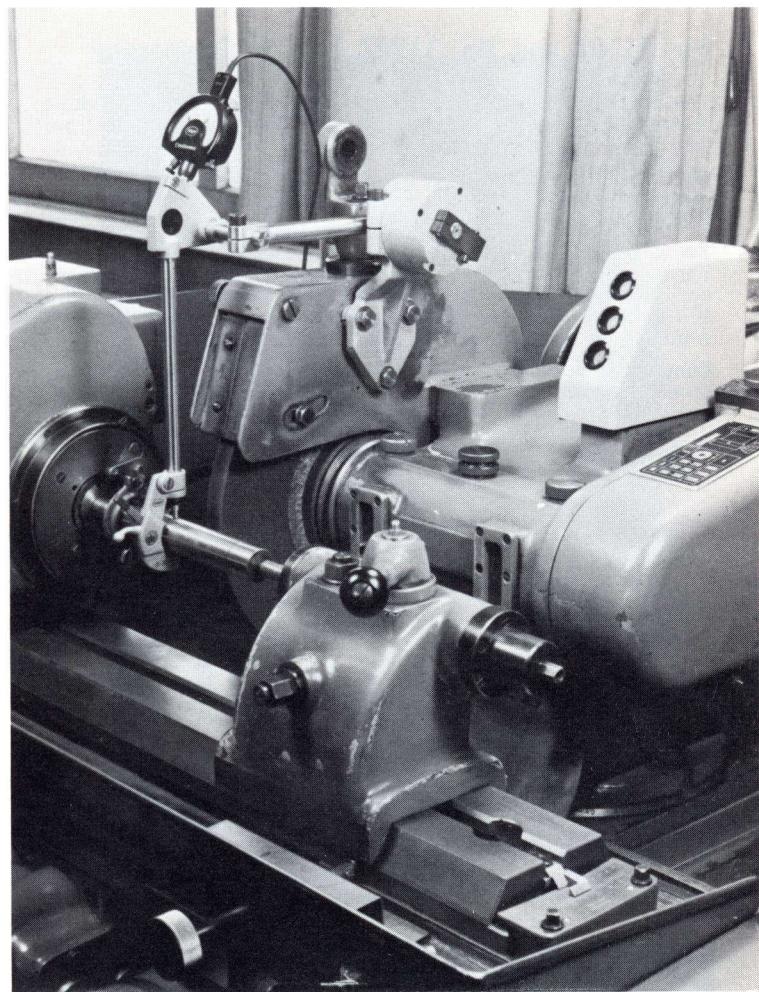
No. 840SB, Interchangeable Measuring Frames for Grinding Gage.

range: .200"-1.200"      1.200"-2.400"  
 2.400"-3.600"      3.600"-4.800"

(These frames are required for use with the Grinding Gage.)

The above Grinding Gage is illustrated with our Electric Comparator. The use of Electric Comparators permits automatic shut-off of the machine when reaching the size limit. With the four-contact comparator (see page 15), complex automatically controlled sizing operations may be performed.

The Grinding Gage may also be used with our mechanical comparators, to be selected from pages 8-9.



Repair and Spare Parts in stock.

## No. 1100 Electric Comparator "Elmess"

Of shockproof construction, with sturdy amplifying mechanism; overtravel. All parts which are subject to wear are TUNGSTEN CARBIDE faced. Precisely made precious metal contacts; chrome finished housing.

**Method of operating:** The contact lever to which the movement of the spindle is transmitted, closes preset contacts when the tolerance limits are exceeded.

**Setting of tolerance limits:** By two play-free set screws, protected by a detachable cap, set to plus and minus tolerances by gage blocks.

## Specifications: No. 1100 "Elmess"

Maximum tolerance setting	.032"
Overtravel	.120"
Contact accuracy	$\pm .000010"$
Measuring pressure	5 oz.
Overall length	$4\frac{5}{8}"$
Largest diameter	$\frac{7}{8}"$
Shank diameter	.315"
Weight	4 oz.

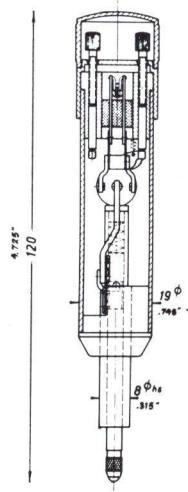
Furnished with standard ball contact tip and with bushing for  $\frac{3}{8}"$ , in wooden case.

Extra Contact Tips, refer to page 9.

Refer to pages 21-24 for suitable stands.

## Observe these important features:

The total range of the "Elmess" Electric Comparator is .032". The contact accuracy is  $\pm .000010"$ .



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## ELECTRIC COMPARATORS

## No. 1110Z and No. 1120Z Electric Comparator

This construction provides reading of gaging result relative to tolerances on the light indicator and of the deviation from the nominal size on the scale of the comparator.

**Method of operating:** The measuring spindle travel is transmitted to a dial and to a contact lever which closes preset contacts when the tolerance limits are exceeded.

**Setting of tolerance limits:** After the comparator is set to nominal size by gage blocks, the contacts can be set to the upper and lower limits by individual fine adjustment screws on the top of the housing. This may be done directly from the scale without the use of additional gage blocks.

**Construction:** Shock protected mechanism. Pivots turn in jewelled bearings. Spindle and mounting shaft made of hardened stainless steel. Electric cord removable from comparator.

Specifications:	"Elzentimess"	"Elmillimess"
Catalog No.	1110Z	1120Z
Graduations	.0005"	.000050"
Total range	±.010"	±.002"
Overttravel	.100"	.110"
Measuring pressure	5 oz.	5 oz.
Contact accuracy	±.000050"	±.000010"
Shank diameter	.315"	.315"
Weight	4 oz.	4 oz.

Furnished with standard ball contact tip and with  $\frac{3}{8}$ " bushing for AGD, with cable release and turn knob, in clear plastic case.

Extra Contact tips, refer to page 9.

Millimeter graduations in 1/100 mm and 1/1000 mm available. Refer to pages 21-24 for suitable stands.

Straight and angular holders for special mounting of comparators, refer to page 9.

Electrical specifications, refer to page 15.

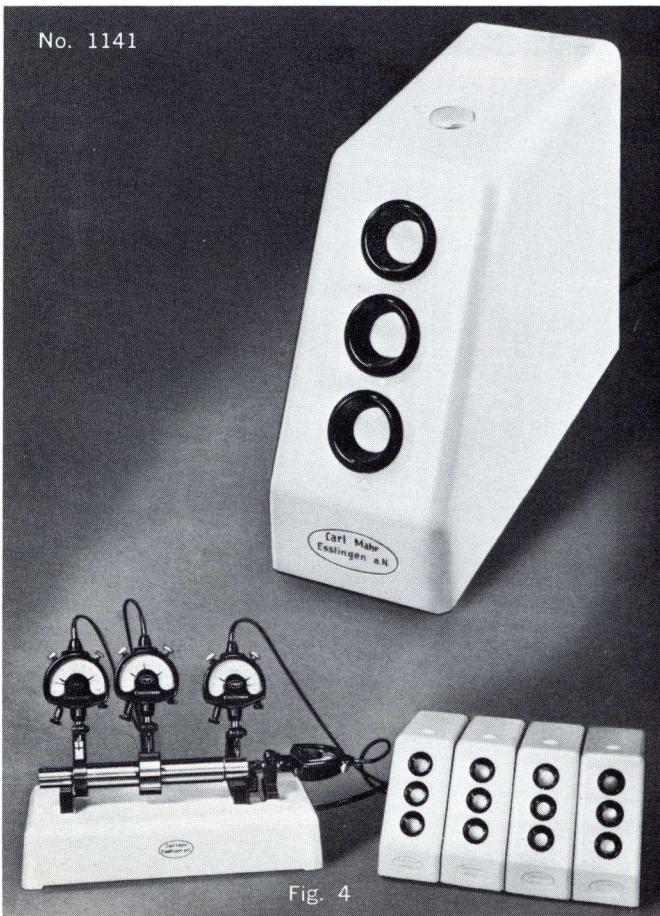
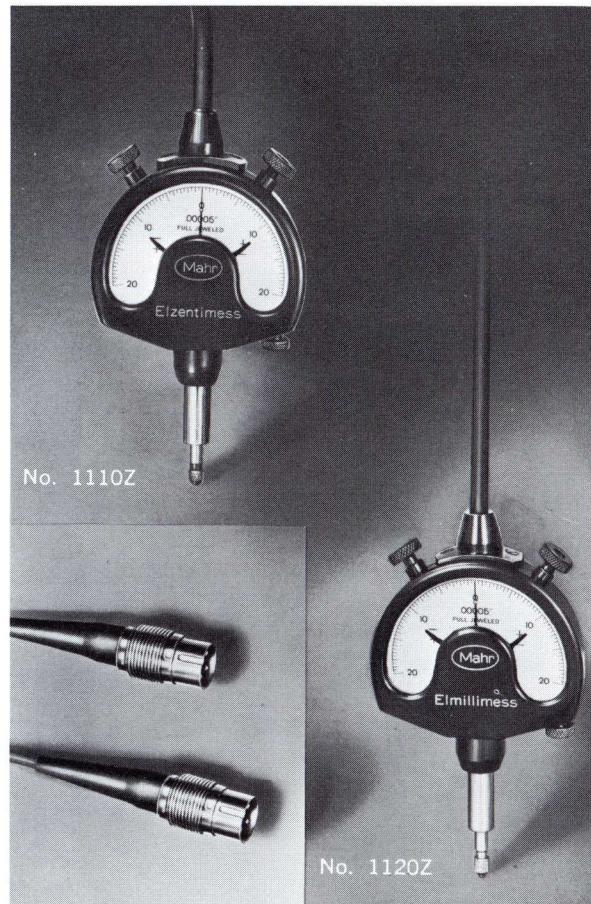


Fig. 4

## No. 1141 Signal Light Box

Indicates undersize, good and oversize by flashing of red, green and white signal lights. A socket provides connections to Electrical Comparators described on pages 13-14.

A second socket is provided to make connections for control purposes. Apparatus has re-arrangeable internal connections for direct operation on 110, 125 or 220 Volts AC, 40-60 cycles.

A switch provides change of rotation of the signal lights for use with inside and outside measurements.

The high grade precision relays for operating the light signals guarantee highest switching accuracy even after many millions of gagings.

Switching accuracy is  $\pm.000010"$  when using Comparator "Elmess" or "Elmillimess" and  $\pm.000050"$  when using Comparator "Elzentimess".

These signal light boxes are extraordinarily robust and vibrationproof. They are shock resistant and have a breakproof housing.

For operation on 110 Volts AC (may be readily changed to 220 Volts or 125 Volts).

If desired, the instrument can be utilized to store measuring results whereby the individual measurements are preserved until the next work is placed under the gage.

Dimensions: 7" x  $2\frac{3}{8}$ " x 5". Electrical specifications on page 15.

## Multiple Inspection

Since the signal lights are vertically arranged, Signal Light Boxes can be placed side by side for multiple inspection, as illustrated. This arrangement offers inexpensive multiple inspection for short-run gaging. In minutes, this equipment may be re-arranged for another job and the Electric Comparators and Signal Light Units may be used over and over again.

Signal Light Boxes for multi-measuring stations can be furnished in every required form. Specify requirements.



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## UNIVERSAL TEST INDICATOR "PUPPITAST"

NEW

"PUPPITAST" No. 800 SZ  
UNIVERSAL TEST INDICATORContact Point at right angle to dial  
moves in an arc of 210°READING  
IN  
.0005"

## Corrosion Resistant — SATIN CHROME BODY

Highest accuracy and repeatability

## Automatic Shiftless Reversing

The measuring direction is automatically reversible. It permits measuring in both directions, namely upward and downward. The rotation of pointer is always clockwise regardless whether contact point is moved upward or downward. This eliminates reading errors of plus and minus deviations due to confusion over movement.

## Radically New Rigid Mounting

(Patent applied for) on rear or underside of the housing. Mounting shaft is moved over a dovetail guide bar. It can be clamped absolutely tight in any desired position by a conveniently located knurled nut — without the aid of a screw driver or other tool.

## High Measuring Accuracy

Due to frictionless running of the movement in combined ball and jewel bearings.

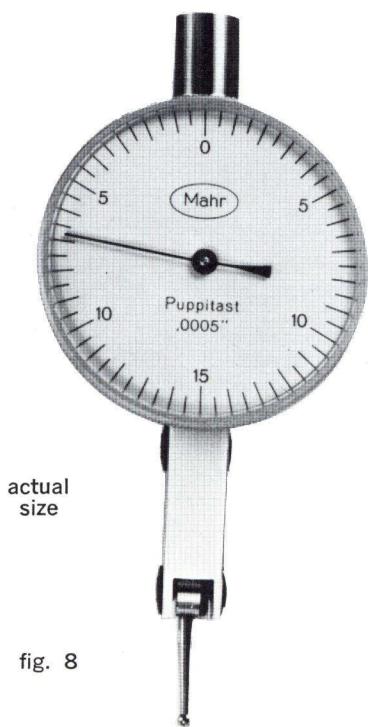
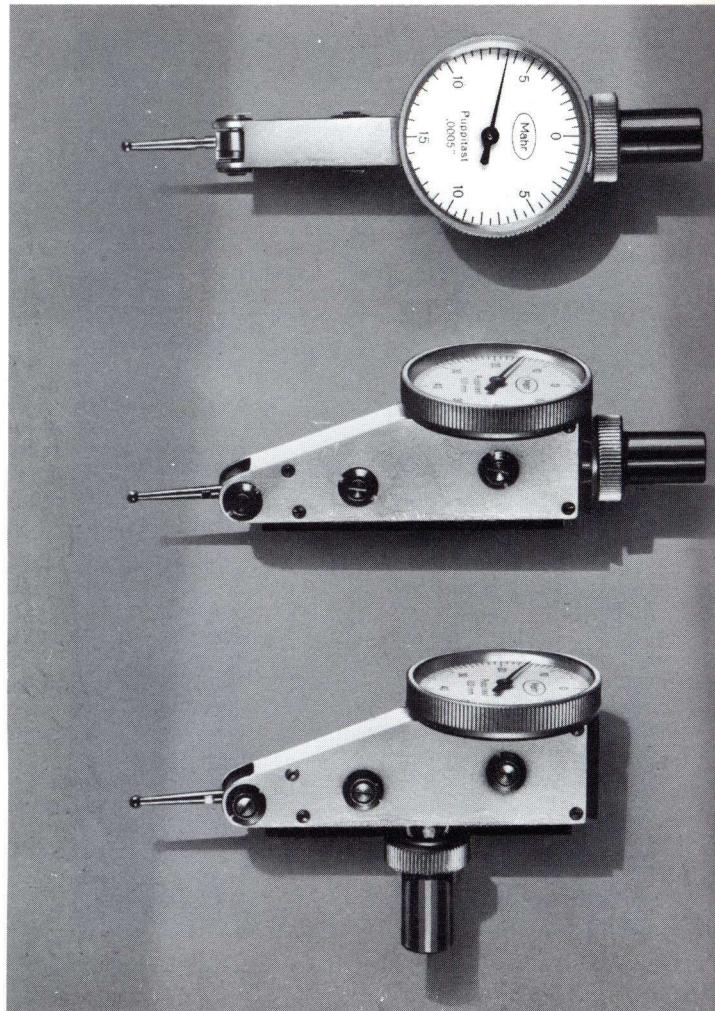
## Favorable Shape

Due to the asymmetrical location of the contact point at the low end of the housing, measuring at hard-to-get-at or low lying places is made possible. The housing is corrosion resistant, satin-chrome finished.

## Specifications:

No. 800SZ	Graduation	.0005"
	Measuring range	.030"
	Measuring pressure	1 oz.
	Dial Diameter	1 1/8"
	Length of contact point	.515"

including 2 mounting shafts (fig. 4 & 5) and adaptor bushing (fig. 6) in plastic case.



No. 800SGZ  
Reading in .0005"  
Extra Large Dial

Graduation	.0005"
Measuring range	.030"
Dial diameter	1 1/8"
Measuring pressure	1 oz.
Length of contact point	.515"

including 2 mounting shafts (fig. 4 & 5) and adaptor bushing (fig. 6) in plastic case.

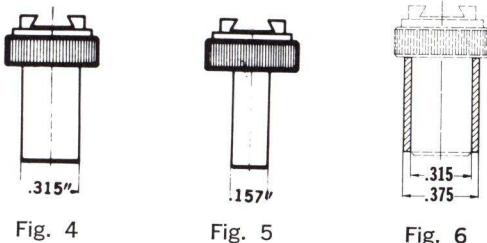


Fig. 4

Fig. 5

Fig. 6



No. 800 h

Fig. 7

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## UNIVERSAL TEST INDICATOR "PUPPITAST"

## No. 800SLZ

Reading in .0005"

Approx. 1 5/8" long Contact point

Graduation	.0005"
Measuring range	.030"
Dial diameter	1 1/8"
Measuring pressure	1 oz.
Length of contact point	1 5/8"

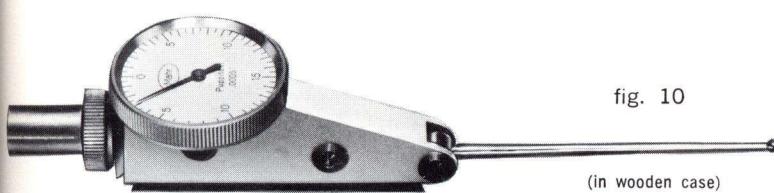


fig. 10

(in wooden case)

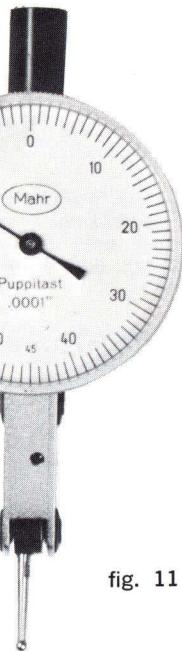


fig. 11

## No. 800SMZ

Reading in .0001"

Extra Large Dial

Graduations	.0001"
Measuring range	.0090"
Dial diameter	1 1/16"
Measuring pressure	1 1/2 oz.
Length of contact point	.515"

actual size

## No. 800WZ

Reading in .0005"

Contact point moving horizontally parallel to dial, left and right.

Graduation	.0005"
Measuring range	.030"
Dial diameter	1 1/8"
Measuring pressure	1 oz.
Length of contact point	.515"



fig. 9

## Standard Equipment

for all 5 models includes 2 mounting shafts (as illustrated on page 16, see fig. 4 & 5) .157" and .315" dia. and adapter bushing .375" for AGD (fig. 6) in unbreakable plastic case, which provides space for the No. 800h Universal Holder.

Metric graduations available.

## Optional Accessories

Universal Holder No. 800h (fig. 7) with swivel joint for mounting Puppitast Indicator. Length 3 3/8" - cross section 1/4" x 1/2".

## Contact Points

have a screw base and are readily interchangeable. The .080" contact point is furnished as standard equipment.

Hardened Steel Point	.515" long .040" ball dia.
Hardened Steel Point	.515" long .080" ball dia.
Hardened Steel Point	.515" long .120" ball dia.
Hardened Steel Point	1 1/8" long .080" ball dia.
Tungsten Carbide Point	.515" long .080" ball dia.
Tungsten Carbide Point	.515" long .080" ball dia.
Ruby Tipped Point	.515" long .080" ball dia.

## No. 800hv Mounting Fixture

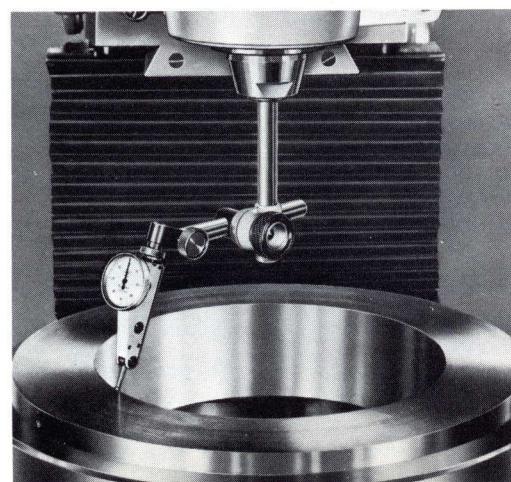
Consisting of 2 columns for the mounting of "Puppitast" Universal Test Indicators as well as Mahr Dial Indicators and Precision Comparators.

For measuring, locating and centering of work pieces on machine tools. Two swivel joints permit either column to be moved in circular direction. A threaded shank on the main column permits attaching of the fixture on machine tools and measuring fixtures.

## Specifications: No. 800hv

Length of main column	6.300"
Diameter of main column	.440"
Length of column holding indicator	4"
Mounting bore for indicator	.315"

Mounting clamp for indicator can be swivelled within 180°.



## ELECTRONIC COMPARATORS

## ELECTRONIC PRECISION COMPARATOR "MILLITRON"

Of latest design for rapid and reliable measuring of small and minute dimensional variations. The super-accurate amplifier has outstanding features such as

Scale selector color coded to scale, offering extreme versatility.

**Fully transistorized** amplification provides highest accuracy and measuring sensitivity. No warm-up required, instrument is ready for measuring upon turning of switch.

**Printed circuits** on interchangeable plates make the unit exceedingly sturdy in operation and simplify maintenance.

**Constant measuring accuracy** and extraordinary stability of zero setting and scale transmission. An exclusive amplifier component guarantees constancy of accuracy even under strong fluctuations of voltage and temperature.

Reading of the multiple scales is simplified by matching colors of the scales with the color of the scale selector knob. Only two sets of divisions are required for the four or five scales, one set being red and the other black. The instrument has a sensitive electric zero adjustment with safeguard against inadvertent disturbances. Changing from scale to scale, the zero setting remains constant; no re-adjustments necessary. The relatively high voltage (6v) permits connection of accessories like recording devices, directly to the unit. The rapidity of transmission, amounting to only one millisecond, enables the instrument to register extremely fast moving actions.

Amplifiers No. 1202Z and 1203Z permit connection of one or two gaging heads. In single measuring with one gaging head, it is possible to change pointer direction between positive and negative by a built-in switch. By simultaneous use of two gaging heads it is possible to observe the sum or difference of the two readings. A switch on the front plate of the amplifier changes the measuring process from sum or difference values to reading of the absolute measuring value in single measuring.



## Specifications:

For Electronic Amplifier "Millitron".

## Accuracy:

Maximum permissible error 1% of the measuring range of each scale. Repeatability within .0000004" (four tenths of a millionth). Stability of zero setting and switch transmission of scales less than .2% over 300 hours.

## Special Features:

Amplifiers are suitable for connection of either a single gaging head for single measuring, or of two gaging heads for measuring of the sum or difference between the two measurements; a built-in switch effects the changeover from single measuring to sum or difference measuring.

## Housing:

Handy, robust steel housing with carrying handle

Dimensions: 8" x 6" x 6"

Weight: 7 lbs.

Voltage: 125, 220V AC  $\pm$  15% 50-60 cycle

## Scales:

**Millitron No. 1202Z** (standard model) with four scales.

Graduation	Range
.000002"	$\pm .0001"$
.000005"	$\pm .0003"$
.00002"	$\pm .001"$
.00005"	$\pm .003"$

**Millitron No. 1203Z** (with increased amplification) with five scales.

Graduation	Range
.0000005"	$\pm .00003"$
.000002"	$\pm .0001"$
.000005"	$\pm .0003"$
.00002"	$\pm .001"$
.00005"	$\pm .003"$

METRIC graduation available.

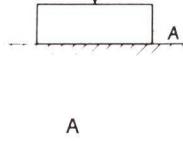
In addition to the standard model No. 1202Z we can furnish a simplified amplifier, Catalog No. 1201Z "Millitron," which has the same graduations and scale ranges as No. 1202Z, but can be used with a single gaging head **only**. It is equipped with tolerance markers and is accurate to within 2% of the measuring range of each scale.

## Special Amplifiers:

Additional special models are available for special measuring purposes, such as run-out and out-of-round conditions, for sorting of work to tolerance grades, whereby the gaging relative to pre-set tolerances is indicated by signal lights ("Millitron S") and for group-classification in statistical quality control with digital read-out, and for control of automatic devices guided by gaging results ("Millipilot") and numerous other applications.

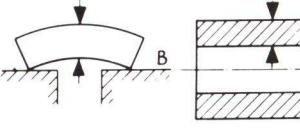
## Typical Measuring Applications:

Single Measuring with one gaging head



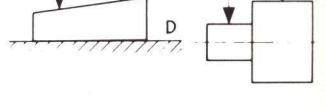
A  
For direct gaging same as with dial indicators or comparators.

Sum of two measurements with two gaging heads

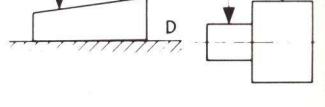


B  
Examples: For measuring of thickness independent from irregularities of shape or contact with reference surface (sketch B), of wall thickness and concentricity of inside and outside diameters (sketch C), out-of-round gaging on shafts, width of discs independent from axial position, parallelism of opposite surfaces, etc.

Difference between two measurements with two gaging heads



C  
Examples: Checking of taper independent from overall dimension (sketch D), measuring concentricity of one diameter against another (sketch E), checking of parallelism of measuring surface to reference surface, flatness, etc.



D  
Examples: Checking of taper independent from overall dimension (sketch D), measuring concentricity of one diameter against another (sketch E), checking of parallelism of measuring surface to reference surface, flatness, etc.

E

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# ELECTRONIC COMPARATORS

## Gaging Heads

All Gaging Heads described below have a stable dull chromed steel housing, are shockproof and have sufficient over-travel to make them safe from damage from mechanical strain. Feeler Points are interchangeable and are ball tipped for standard applications; other types of feeler points are available. Gaging Heads are interchangeable among each other and need no special fitting to any particular amplifier "Millitron."

### No. 1302 Gaging Head

Spindle with ball suspension retractable by camera cable release  
Repeatability: .0000008"

Gaging Pressure: 1 oz.  
Increase in pressure per .001" travel .2 gram.  
Over travel: .060"  
Dimensions:  $3\frac{1}{2} \times \frac{1}{16} \times \frac{1}{16}$ "  
Mounting Shaft: .315" or .375" diameter

### No. 1312 Gaging Head

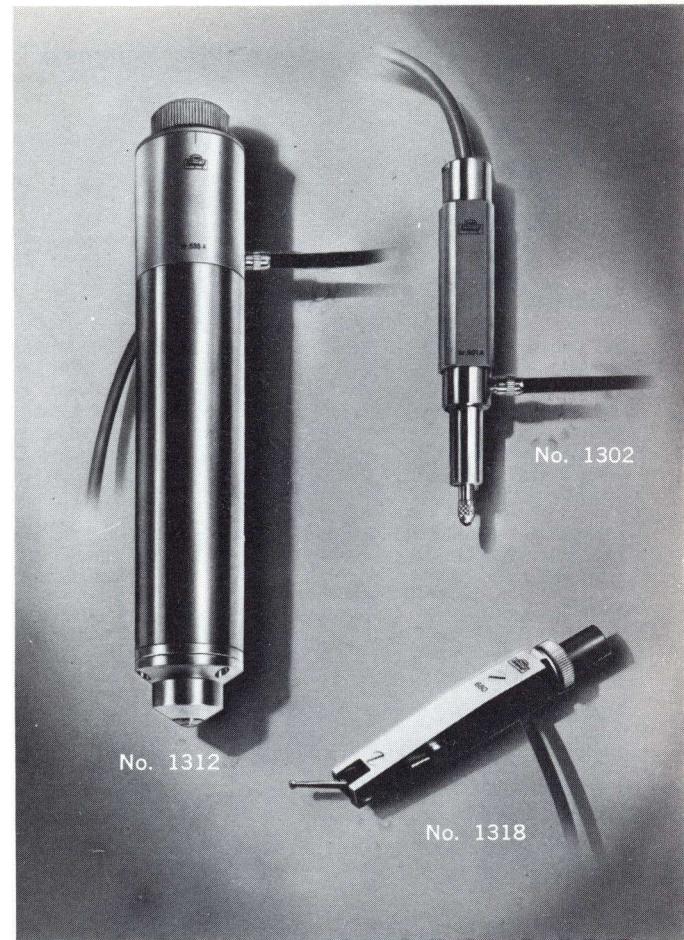
Spindle with diaphragm suspension retractable by camera cable release  
Measuring pressure adjustable by knurled knob  
Measuring Pressure: Adjustable between  $1\frac{1}{2}$  oz. and  $4\frac{1}{4}$  oz.  
Repeatability: .0000004"

Over Travel: .020"  
Dimensions:  $5\frac{1}{8} \times 1\frac{1}{8}$ "  
Length of mounting shaft:  $2\frac{3}{8}$ "  
Diameter of mounting shaft: 1.1025"  
Also available without adjustable measuring pressure, having constant pressure of  $3\frac{1}{2}$  oz. (Use Catalog No. 1311).

### No. 1318 Gaging Head "Puppitron"

With feeler point moveable sideways to any angular position within an arc of  $210^\circ$ , direction of movement reversible, clamped on a mounting shaft moveable over a dovetail guide bar either on bottom or rear of housing.

Repeatability: .000008"  
Measuring Pressure: 1 oz.  
Length of feeler point:  $1\frac{1}{2}$ "  
Diameter of mounting shaft: .315" or .375" with addition of a split bushing.



## Comparator Stands

For "Millitron" Electronic Comparators. They are rigidly constructed and designed for most accurate measurements.

### No. 1420 Comparator Stand

For measuring of gages, length standards, fine wires and precision parts of all kinds.

Measuring range	$0 - 3\frac{3}{4}$ "
Diameter of table	.2"
Diameter of mounting bore	1.1025"

Here is a rigidly constructed stand of outstanding strength and solidity, particularly suitable for the most accurate measurements of small parts. The Gaging Head may be adjusted in the mounting bore. A fine adjustment is a built-in feature.

The table has 3 accurately lapped carbide support ridges which may be set lengthwise or cross-wise. For the measuring of very small or specially formed parts different supports or special anvils can be supplied, which may be placed on the standard surface.

### No. 1425 Universal Comparator Stand

For measuring of larger precision parts.

Table dimensions	$5\frac{1}{8} \times 5\frac{1}{8}$ "
Measuring range	$0" - 7"$
Throat (column to gaging point)	4"
Diameter of mounting bore	1.1025"

Base and vertical column are of one piece construction for obtaining of maximum stability. Rack and pinion raise and lower the horizontal arm on the vertical column by 7". The horizontal arm has a built-in fine adjustment. The serrated measuring table is hardened, ground and accurately lapped. All working parts are satin chrome finished.

Optionally available for the measuring of small parts:

### No. 1428 Auxiliary Measuring Table

Which may be mounted on above stand No. 1425.

Table Surface	$4 \times 1\frac{1}{16}$ "
---------------	----------------------------

This table is reversible. One side serrated lengthwise, the other side is a plane, most accurately lapped surface. An adjustable back stop is furnished.

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## LARGE PRECISION COMPARATOR

## No. 1000Z Precision Comparator "Millimess"

## Large Type

Reading directly in .000050" or .000025", for comparative measurements of HIGHEST ACCURACY in inspection and shop. To be used on stands as illustrated on pages 19, 21 and 22, or to be built into existing fixtures or incorporated into special measuring devices and machine tools.

## Specific Characteristics and Advantages

All polished pivots turn in jewelled bearings. The measuring motion is transmitted by a precision steel ball rolling along a finely lapped sapphire surface. Rapid measurements due to damping of the dial hand. The dial hand does not swing but moves instantly to the proper reading. The measuring spindle has an overtravel of .200" beyond the scale range and can be raised far enough when required by special measuring situations.

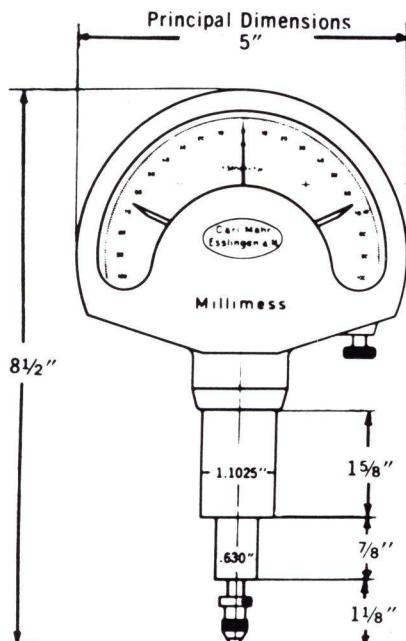
Measuring spindle with plane, most accurately lapped measuring face. The spherical contact point is mounted in a screw clamped split bushing which slips over the measuring spindle.

Dust protection: A rubber sleeve guards the measuring spindle guide at the shank against dust and dirt penetration.

Constant Measuring Pressure.

No Knife Edge Bearings.

Extremely rugged for shop use.



Precision Comparator "Millimess," large type

## Specifications:

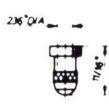
	No. 1000Z	No. 1000ZA
Reading directly in	.000050"	.000025"
Total measuring range	±.002"	±.002"
Accuracy over entire measuring range	±.000050"	±.000050"
Width of single division	.090"	.045"
Overtravel of measuring spindle	.200"	.200"
Measuring pressure	10 oz.	10 oz.
Weight	1 1/2 lbs.	1 1/2 lbs.

Including wooden case, with standard steel ball contact tip and with cable release.

METRIC graduations, reading in 1/1000 mm are available.

## Interchangeable CONTACT POINTS available

## Standard



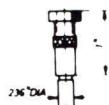
MA 1

Standard Steel Ball

## Tungsten Carbide Ball

Ruby Ball

## Extension



MA 2

Ball tip contact points can also be furnished to order with following ball diameters:

.078" .118" .255" .315" .433" .551" .699" .787" .937" 1.187"

## Plane



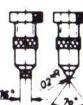
MA 3

## Pointed



MA 4

## Blade



MA 5

Tungsten Carbide tipped

## Ball Tip



MA 6

Standard Ball diameter .196"



# COMPARATOR STAND

## No. 1028 Heavy Comparator Stand

for Comparator "Millimess", large type, No. 1000Z and No. 1000ZA.

Observe T-shaped base providing unusual stability and requiring little space on the work bench. The measuring table is easily accessible. Furnished with adjustable back stop. Measuring table is reversible. One side serrated lengthwise, other smooth precision ground and lapped. A 4" x 4" serrated table (Cat. No. 1028a) can be furnished and is readily interchangeable. The moveable bracket holding the comparator may be raised and lowered on the precision ground and hardened vertical column by knurled ring nut. A fine adjustment is provided by a moveable bushing, adjustable in the bracket by a knurled ring nut. The final precise adjustment may be made with the fine adjustment screw on the outside of the housing of the comparator.

Other accessory tables can be furnished as specified on bottom of this page. This stand can also be supplied with a smaller bracket for mounting of small Comparators which are shown on page 8 and 9, as well as Electric Comparators, pages 13-15. For ordering this stand use catalog No. 1028K.

### Specifications:

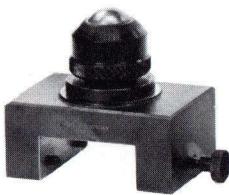
Table surface	4" x 1 $\frac{1}{16}$ "
Vertical capacity	6 $\frac{1}{4}$ "
Throat (column to gaging point)	4"
Overall height	18"
Diameter of mounting bore	1.1025"
Weight	.45 lbs.

### Mahr Heavy Comparator Stands

are a new concept in design. They provide rigidity for repeat readings with high amplification comparators.

### Accessory Tables

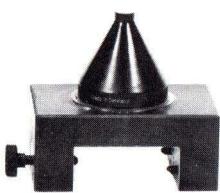
optionally available as follows:



1028b



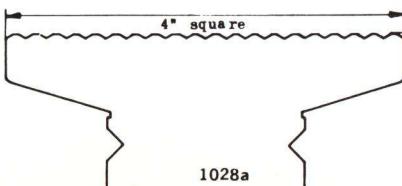
1028d



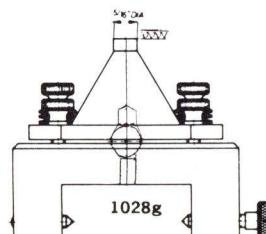
1028c



1028e



1028a



Stand  
No. 1028

### Specifications for Available Accessory Tables for No. 1028 Stand:

- No. 1028 a Serrated table 4" x 4"
- No. 1028 b Large ball anvil table  $\frac{3}{8}$ " radius
- No. 1028 c Pin anvil table 5/16" diameter flat
- No. 1028 d Wring-on table  $\frac{3}{4}$ " diameter flat
- No. 1028 e Wring-on table  $\frac{3}{8}$ " diameter flat
- No. 1028 g Adjustable table with plane surface of 5/16" diameter

All measuring tables are **HARDENED** and **PRECISION LAPPED**.

Refer to page 22 for additional types of large Comparator Stands.



Repair and Spare Parts in stock.

Mahr

## COMPARATOR STANDS

## No. 1025 Heavy Comparator Stand

For Comparator "Millimess," large type, No. 1000Z and 1000ZA. The table surface is serrated lengthwise, hardened and precision lapped. The moveable bracket holding the comparator may be raised and lowered on the precision ground and hardened vertical column by knurled ring nut. A fine adjustment is provided by a moveable bushing, adjustable in the bracket by a knurled ring nut. The final precise adjustment may be made with the fine adjustment screw on the outside of the housing of the comparator.

## Specifications:

## No. 1025 Heavy Comparator Stand

Table surface	5 1/8" x 5 1/8"
Vertical capacity	7"
Throat (column to gaging point)	4"
Overall height	15"
Diameter of mounting bore	1.1025"
Weight	45 lbs

**Accessory tables**, all of them are hardened, ground and lapped, optionally available as illustrated:

1025a	1025b	1025c	1025d	1025e
serrated	serrated	pin anvil	spherical	wring-on
4" x 9/16"	3 3/16"	table	table	table
only used	diameter	3/8" dia.	3/4" radius	3/4" dia.
with 1025b				

## No. 825S Heavy Comparator Stand

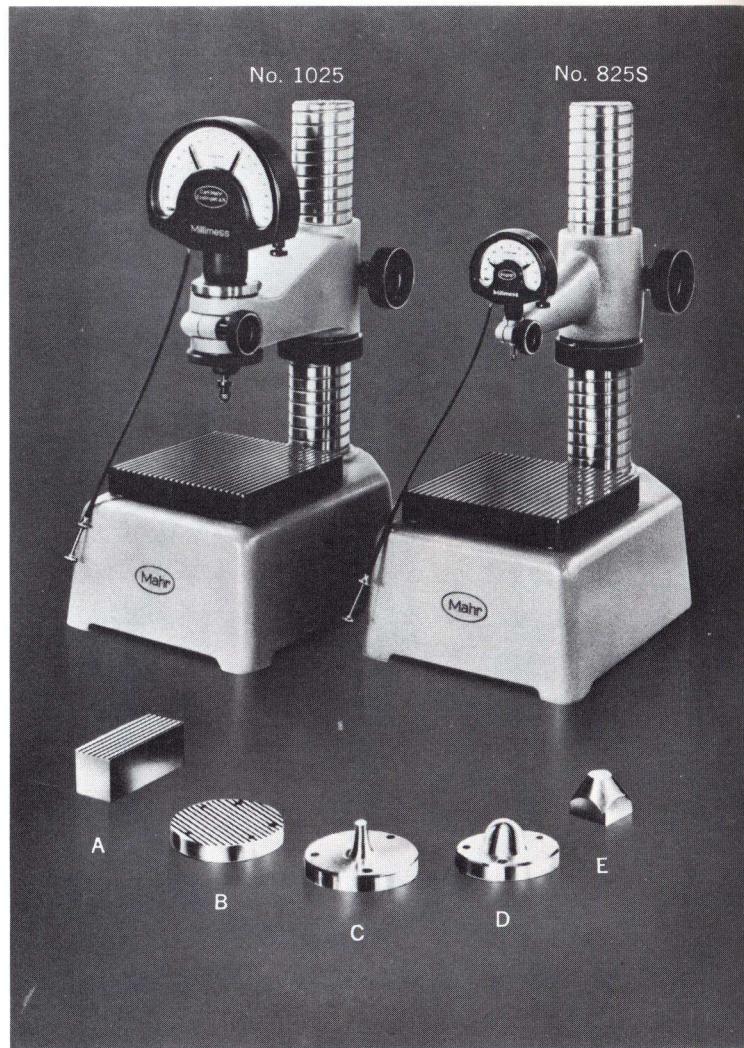
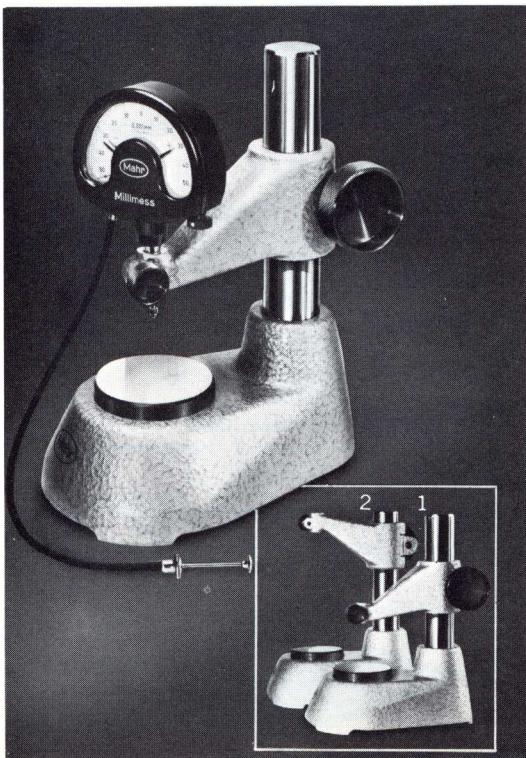
For mounting of small comparators, as shown on page 8 and 9 of catalog as well as electric Comparators, pages 13-15. This unit is identical with No. 1025 Stand, except it is supplied with a smaller bracket to accommodate small comparators, as illustrated.

## Specifications:

## No. 825S Heavy Comparator Stand

Table surface	5 1/8" x 5 1/8"
Vertical capacity	8"
Throat (Column to gaging point)	4"
Weight	43 lbs.
Diameter of mounting bore	.315"
Overall height	15"

**Accessory Tables** optionally available as illustrated and specified above.



## No. 820 Small Comparator Stand

For small Precision Comparators, Dial Indicators and Electric Comparators.

This measuring stand is of extraordinary quality. The table is hardened and precision lapped. It will serve for the inspection of small work pieces, flat as well as cylindrical.

For coarse adjustment move bracket on the hardened and ground vertical column. Fine adjustment is made by turning the fine adjustment screw at the right of the comparator or by turning the dial of a dial indicator.

The bracket may be inverted to increase the measuring range. The measuring range when used as in illustration 1) 0" - 2 3/8" when used as in illustration 2) 2" - 4 1/2".

## Specifications:

## No. 820 Comparator Stand

Measuring range	0" - 4 1/2"
Diameter of table	2"
Throat (column to gaging point)	2"
Overall height	7"
Weight	5 3/4 lbs.

## Optionally available:

This stand can be furnished with **SINTERCERAMIC** table. The hardness of this material is superior to tungsten carbide and guarantees longest wear. Specify: No. 820 SINTERCERAMIC

Mahr

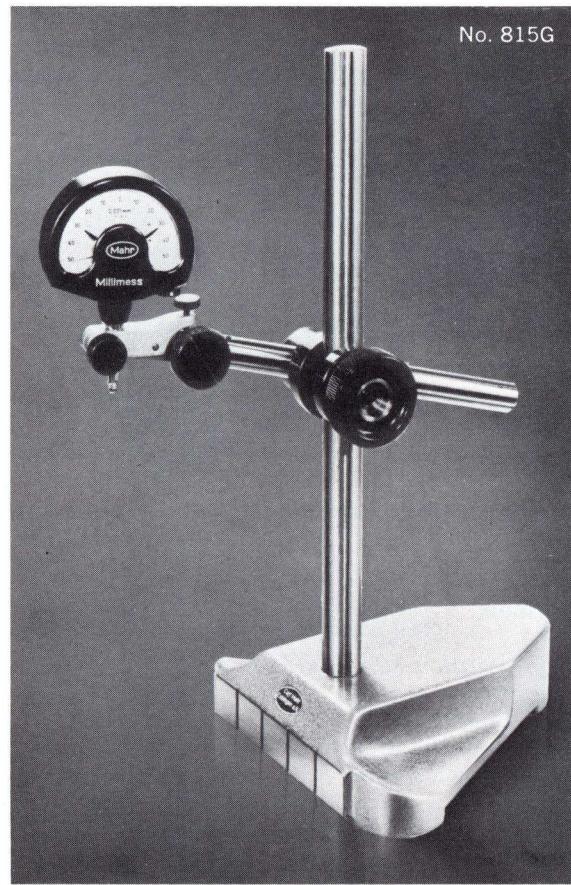
## COMPARATOR STANDS

## No. 825 Large Comparator Stand

A truly high precision stand. Special care has been taken in finishing the table surface, which is serrated, hardened, ground and precision lapped. Rapid adjustment of the dial indicator is accomplished by moving it along the hardened and ground horizontal and vertical columns. Fine adjustment by turning the dial, or with Precision Comparators by the fine adjustment screw on the right of the housing.

## Specifications: No. 825

Table Surface	6" x 4"	6" x 4"
Vertical Capacity	6 $\frac{1}{4}$ "	12"
Mounting Bore	.315"	.315"



## No. 815S Extra Heavy Duty Stand

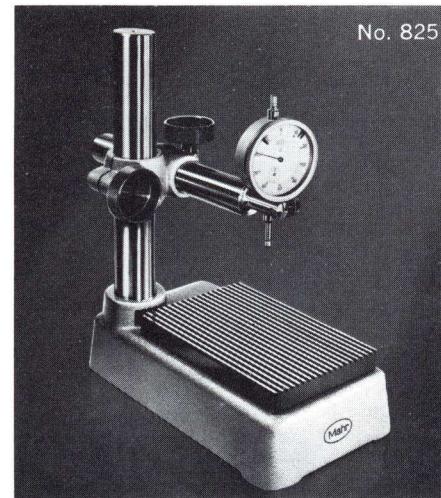
With fine adjustment, for Mahr Dial Indicators and Comparators.

Extremely heavy and ruggedly made. To be used when highest accuracy is required in using a comparator.

The surface of the H-formed base, the column and the extension arm are high precision ground. The column can be moved and clamped in any position on the base with a knurled nut. The fully adjustable extension arm is rigid and vibration-free. A fine adjustment permits zero setting of indicator without touching the indicator and without vibration.

## Specifications:

Height overall (including base) .....	16"	24"	35"
Maximum horizontal extension .....		14"	
Length of base .....		12"	
Width of base .....		4"	
Diameter of column .....	1.575"		
Diameter of extension arm .....		1"	
Mounting bore for indicator .....		.315"	



## No. 815G Measuring Stand

With fine adjustment.

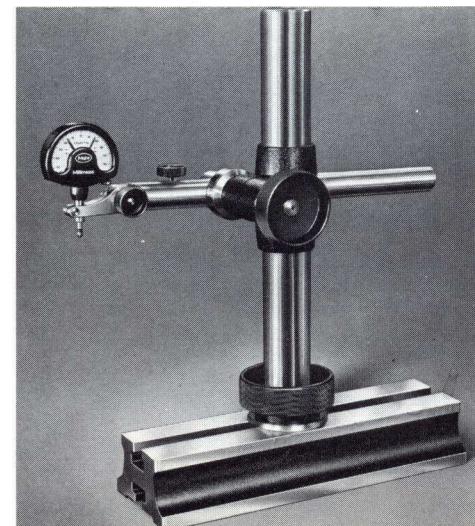
This new stand is particularly well suited for use on plane surfaces, such as cast iron or granite surface plates. Its heavy triangular base assures high stability and prevents tilting. The sturdy columns of .710" diameter give utmost rigidity. Three flat surfaces on the underside of the base provide perfect contact position; the stand can be moved on the surface plate easily and free of vibration. The top of the base has a recess on either side for comfortable gripping. At the base of the triangle there is a ground flat surface to permit movement of the stand alongside edges or flat surfaces. This makes the stand ideal for checking for parallelism.

A novel conical clamping device for the columns adjusts the stand quickly and simply to any height and provides secure setting in any position with moderate tightening. The indicator carrier at the front end of the horizontal arm can be swivelled within 90°; as a result, dial indicators, comparators or dial test indicators "Puppitast" may be used in horizontal position. A fine adjustment screw permits convenient setting to the desired dimension.

The mounting bore of the indicator holder is for  $\frac{3}{8}$ " I.D. and will accommodate all Dial Indicators made to AGD specifications.

## Specifications:

No. 815G	Height of column (including base)	12"
	Throat depth	8"
	Diameter of column	.710"
	Base dimensions	6" x 6"
	Mounting bore	$\frac{3}{8}$ " (AGD)



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## MAGNETIC INDICATOR STANDS

## No. 815MG Indicator Stand "MAGNE-FLEX"

With adjustable gooseneck holding arm which permits rigid locking in any position.

The magnetic holding force is 100 lbs. The heavy base has an on- and off-switch. Two magnetic surfaces: end surface opposite from switch and V-angle bottom with 90° for placing on cylindrical shafts with diameter from  $\frac{3}{4}$ " to  $4\frac{3}{4}$ ", as well as on plane surfaces.

## Specifications:

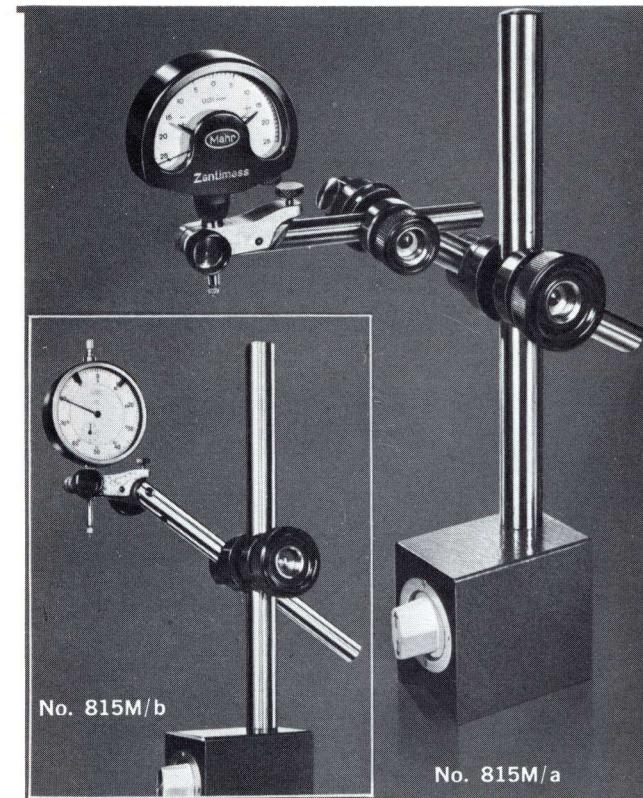
No. 815MG

Overall height	13 $\frac{3}{4}$ "
Dimension of magnetic base	2 $\frac{3}{4}$ " x 1 $\frac{3}{4}$ " wide
Magnetic pull	100 lbs.
Mounting bore	$\frac{3}{8}$ " I.D.
Weight	4 lbs.

The gooseneck holding arm consists of a series of bushings which are connected with each other by steel balls. Consequently, they function like a universal ball joint, offering nearly unlimited flexibility.

The mounting bore of the indicator holder is for  $\frac{3}{8}$ " I.D. and will accommodate all Dial Indicators made to [AGD specifications](#).

A [fine adjustment](#) permits most accurate setting of indicator. For the tightening of the cable tension a convenient adjustment has been provided.



## No. 815P Indicator Stand with FINE ADJUSTMENT.

With round, sturdy MAGNETIC BASE. Suitable for "Puppitast" Universal Test Indicators and all models of MAHR Dial Indicators and Comparators.

## Specifications:

No. 815P

Height of column, including base	6"
Diameter of base	1 $\frac{3}{4}$ "
Magnetic pull	22 lbs.
Mounting bore	.375" (AGD)

The mounting bore of the indicator holder is for  $\frac{3}{8}$ " I.D. and will accommodate all Dial Indicators made to [AGD specifications](#).



## No. 815M Indicator Stand

With magnetic base and with [FINE ADJUSTMENT](#).

Magnetic stand has on- and off-switch. The magnetic holding force is 100 lbs. Simple and quick setting is obtained by a [new](#) clamping of the extension arm, which guarantees absolutely rigid clamping even with moderate tightening.

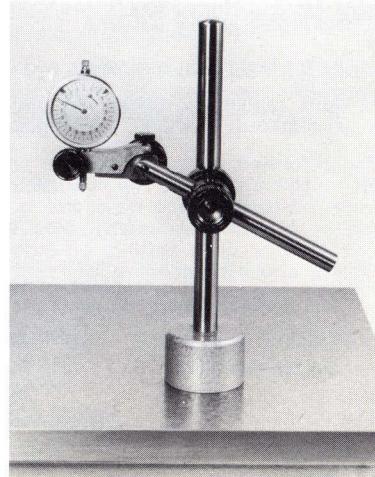
The V-grooved base permits mounting of the stand on shafts with a diameter range  $\frac{3}{4}$ "— $4\frac{3}{4}$ ". Two types of indicator stands are available:

Specifications:	No. 815M/a with 2 double joints
	No. 815M/b with 1 double joint

Height of column	8"
Length of base	2 $\frac{3}{4}$ "
Width of base	1 $\frac{3}{4}$ "
diameter of column	.710"
mounting bore	.375" (AGD)

When magnet is turned "ON," the base remains firmly clamped in any desired position without other clamping device; both hands are freed.

The mounting bore of the indicator holder is for  $\frac{3}{8}$ " I.D. and will accommodate all Dial Indicators made to [AGD specifications](#).



Mahr

# SELFCENTERING BORE GAGES

With supersensitive comparator gaging heads, reading directly in  
 20 millionths,  
 50 millionths,  
 tenths or  
 $\frac{1}{2}$  thousandths  
 of an inch.

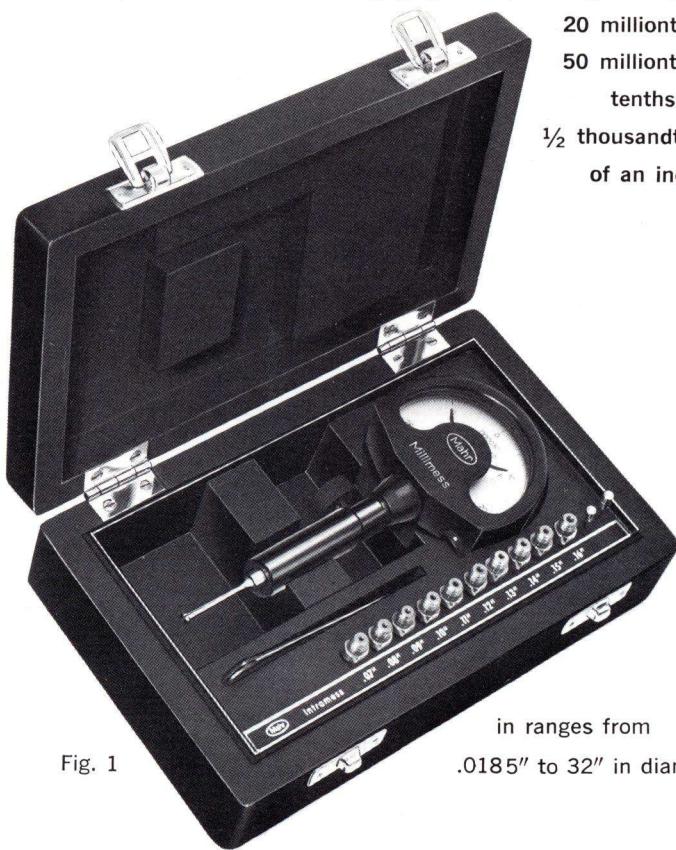


Fig. 1

in ranges from  
 .0185" to 32" in diameter

## No. 844 Mahr Selfcentering Bore Gage

Checks bores in any  
 spot or depth for  
**DIAMETER**  
**RUNOUT and TAPER**  
 to an accuracy of 50 millionths  
 of an inch.



Fig. 3

The accurate measuring of  
 bores is much more difficult  
 than taking outside dimensions  
 as shown here.

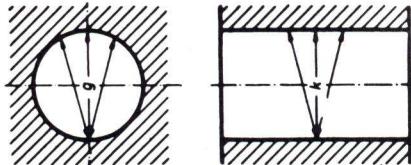


Fig. 2

It is necessary to find simultaneously the maximum distance (g) at right angles to the axis and the minimum distance (k) along the axis as shown in fig. 2.

1. Introduce into Bore
2. Rock in the Bore
3. Read the Dial

*That is all!*

Here is a NEW concept of an INTERNAL COMPARATOR.

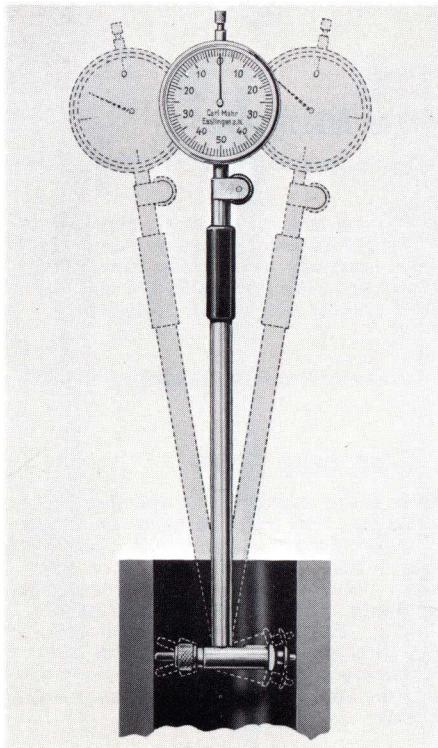


Fig. 4

MAHR Bore Gages have the distinct advantage of reliable automatic centering inside the bore to be measured and provide a fast and reliable check for dimensions and shape.

Guaranteed accuracy of .000050".

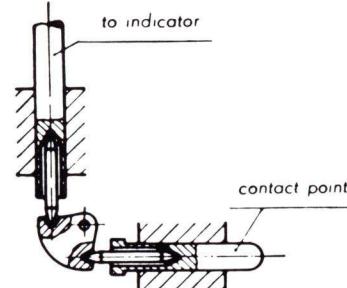


Fig. 5

### Outstanding Features of MAHR Selfcentering Bore Gages

MAHR Bore Gages have a patented linkage system operating practically without friction. As shown in fig. 5, the movement of the built-in moveable anvil is transferred to the comparator head free from play and error over a transmission lever and pointed rods which function **frictionless** within bearings. The transmission rod is easily accessible for cleaning purposes by removal of the centering bridge.

Interchangeable gaging anvils in combination with spacer washers of varying thickness give each set of bore gages a **large measuring range**. The interchangeable gaging anvils as well as the built-in sensitive anvil can be furnished **TUNGSTEN CARBIDE TIPPED** for protection against wear.

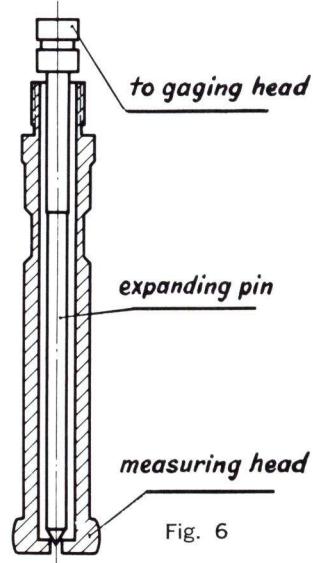


Fig. 6

MAHR Bore Gages below .700" measuring range employ interchangeable spring loaded split ball measuring heads as shown in Fig. 6. These measuring heads transfer their movement over a tapered, precision lapped expanding pin to the Precision Comparator. For protection from wear the measuring heads are **hard chromed**. Measuring heads from .160" up can be furnished **ruby tipped**, on request.

Request Repair Parts List with prices.

Repair and Spare Parts in stock.

## SMALL SELFCENTERING BORE GAGES

## No. 844 Small Mahr Selfcentering Bore Gages

Ranges **.0185"** to **.720"**, with supersensitive comparator gaging heads reading directly in **.000020"**, **.000050"**, **.0001"** or **.0005"**.

Mahr Small Bore Gages have interchangeable spring-loaded split-ball measuring heads, which are hard chrome plated for maximum wear. Ruby tipped measuring heads are optionally available, starting at **.160"**. (Ask for prices.)

## Specifications:

Range:	Bore depth	Range of each probe	Number of probes in set
.0185" - .038"	$\frac{1}{6}$ " - $\frac{1}{8}$ "	.0018" - .004"	6
.038" - .060"	$\frac{1}{2}$ "	$\pm .004"$ - $.002"$	5
.060" - .160"	$\frac{3}{4}$ " - 1"	$\pm .010"$	10
.160" - .280"	$1\frac{1}{6}$ "	$\pm .012"$	7
.280" - .400"	$1\frac{1}{6}$ "	$\pm .012"$	7
.400" - .720"	$1\frac{7}{8}$ "	$\pm .024"$	9

Each set is furnished in black hardwood case but **without** comparator gaging head.

Select Precision Comparator from pages 8-9 or select Dial Indicator from pages 10-11. MAHR Precision Comparators and Dial Indicators are interchangeable in the various ranges which are specified above. Each gage will therefore meet **all** tolerance specifications.

Metric ranges available.

**Setting** of MAHR small Bore Gages can be accomplished with standard ring gages, Snap Gage or Micrometer setup with gage blocks.

**Blind holes:** Special interchangeable measuring heads for shallow bores and bottom of blind holes can be furnished in the following ranges: **.070"** to **.700"** Request quotation.



Fig. 7



Fig. 9

Fig. 8

## Right Angle Attachment No. 844AW

To fit all small Bore Gages range **.038"** to **.720"**.



Fig. 10

## Extensions No. 844VL

For deep bores, to fit all small Bore Gages range **.320"** to **.720"**.

Precision Comparator Stand will speed up inspection. Refer to page 28.

## No. 844AW Right Angle Attachment

To fit all small MAHR Bore Gages from **.038"** to **.720"**. (Refer to Fig. 8.)

A most practical and economical accessory for the checking of bores in hard-to-get-at places. Screw into gage holder and check small bores without removing work piece from underneath bore spindle. One or more extensions #844VL as shown in Fig. 10 can be added, if greater bore depth is desired.

## Specifications:

No. 844AW Right Angle Attachment to fit all ranges from **.038"** to **.720"**.

## No. 844VL Extension for deep bores

For the checking of deep bores beyond the specified bore depth of our small Bore Gages. They may be used for ranges starting at **.320"** up to **.720"**. Each extension will add  **$2\frac{1}{2}$ "** bore depth to the standard bore depth of each Bore Gage. Several of these extensions may be added to one Bore Gage to achieve desired bore depth. Each extension is a self-contained unit as shown in Fig. 10. The transfer movement to the comparator operates frictionless assuring highest sensitivity and guaranteeing accuracy even if several extensions are used in one set-up. They may also be used in connection with Angle Attachment No. 844AW.

## Specification:

No. 844VL Extension for Small Bore Gages to fit all ranges from **.320"** to **.720"**.

Small Bore Gages for ranges from **.180"** to **.320"** can be furnished with one or more extensions,  **$2\frac{1}{2}$ "** long for deeper bores TO SPECIAL ORDER. They require also special gaging pins and special measuring heads. REQUEST PRICES. Please specify required BORE DEPTH and bore diameters.

Mahr

# LARGE SELFCENTERING BORE GAGES

## No. 844 Large Mahr Selfcentering Bore Gages

Ranges .700" to 32.000 inches.

With super sensitive comparator gaging heads reading directly in .000020", .000050", .0001" or .0005".

MAHR large Bore Gages employ a spring loaded centering bridge and have a patented linkage system operating practically without friction (see fig. 5 on page 25). Interchangeable measuring anvils and spacer washers are furnished with each set for obtaining the following ranges:

### Specifications:

Range	Bore Depth
.700" to 1.400"	6 $\frac{3}{4}$ "
1.400" to 2.400"	8"
2.000" to 4.000"*	10"
4.000" to 6.400"	12"
6.400" to 10.000"	16"
10" to 16"	20"
16" to 32"	40"

\*An extension for the 2"-4" set will increase the range to 6".

Each set is furnished in black hardwood case but without comparator gaging heads. Select Precision Comparators from pages 8-9 or select Dial Indicator from pages 10-11. MAHR Precision Comparators and Dial Indicators are interchangeable in the various ranges which are specified above. Each gage will therefore meet all tolerance specifications.

METRIC ranges are available.

### TUNGSTEN CARBIDE tipped anvils

On request, we will furnish the interchangeable measuring anvils as well as the built-in sensitive anvil tipped with TUNGSTEN CARBIDE. Specify "TUNGSTEN CARBIDE", if desired, and refer to respective price specification in price list.



Fig. 12

Extensions No. 844VL for large Bore Gages No. 844  
For the checking of extremely deep bores.

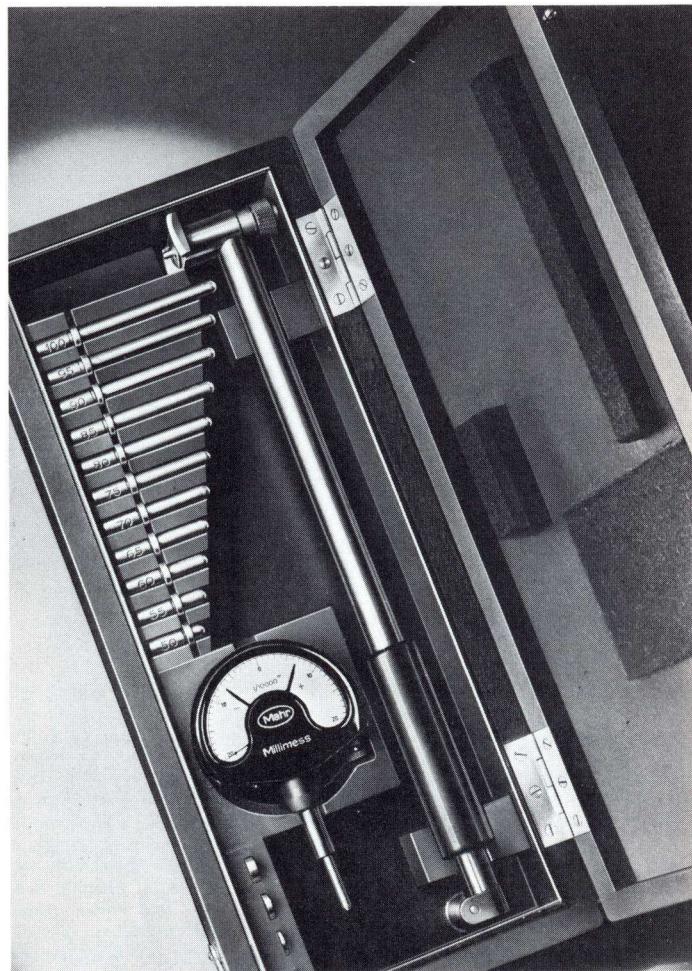


Fig. 11

**Setting:** For setting of the Bore Gages, we offer Setting Device No. 844EV which employs standard gage blocks advantageously. Refer to page 28. Standard ring gages are also a recommended means for setting.

Right Angle Bore Gages in large sizes, refer to page 29.

### Extensions No. 844VL

For large Bore Gages No. 844, for the checking of extremely deep bores, beyond the specified bore depth capacity of our Bore Gages.

Each extension is a selfcontained unit, as shown in fig. 12, and is furnished in a black finished hardwood case. The handle has a thermal insulating grip to prevent heat transfer from hand of operator. The transfer movement to the comparator operates frictionless, assuring highest accuracy. These extensions are inserted between Bore Gage Holder and Comparator.

**Specifications:** Extensions No. 844VL, for large Bore Gages No. 844 suitable for Bore Gage ranges

adding bore depth of

.700" to 4.000"	10"
20"	20"
40"	40"
4.000" to 32.000"	10"
20"	20"
40"	40"
80"	80"

including black finished hardwood cases.

Mahr

## SELFCENTERING BORE GAGES

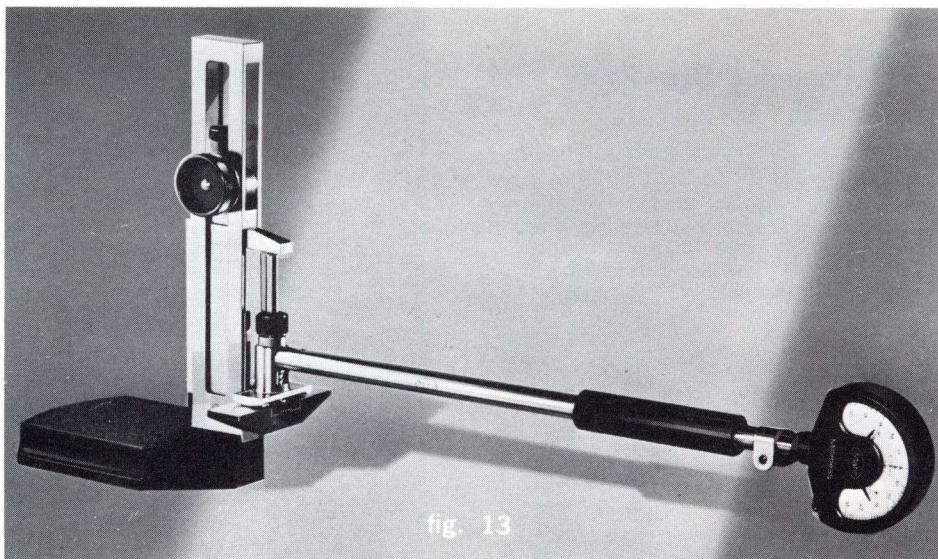


fig. 13

## No. 844EV Setting Device

for large MAHR Bore Gages #844, offers the best method of setting Bore Gages to the inside diameter to be checked, by using standard gage blocks. This setting device has distinct advantages over former types now on the market. The gage blocks can be quickly inserted and removed for changing the dimensions without removing the holder. This unit consists of a heavy base, which is hardened, ground and accurately lapped. It is extremely rigid. Gage block holders of various lengths, with capacity up to 32", can be firmly locked to the base block by screw from bottom of base. The gage blocks are clamped between an upper and a lower jaw. The lower jaws have an elevated platform for resting the selfcentering bridge of the bore gages simulating actual working condition while gaging a bore. Lower measuring jaws have to be selected for various ranges.



fig. 14

## Specifications:

Setting Device #844EV, consisting of:

Lower measuring jaw suitable for bore gage range	Gage Block Holder capacity
.700" to 1.400"	0"- 4"
1.400" to 6.400"	4"- 8"
6.400" to 16.000"	4"-16"
16" to 32"	16"-32"

Upper measuring jaw suitable for all capacities.	Base, extra heavy, hardened, ground and accurately lapped for use with gage block holders of all capacities.
--	--

## No. 844ST Precision Comparator Stand

For use with MAHR small Bore Gages #844, for ranges up to .720".

This practical stand will speed up inspection of mass produced parts. Very rugged construction with hardened and ground table; with lever for raising or lowering of table. The hardened platform table can be raised by approximately  $1\frac{1}{8}$ " by lever for bringing workpiece into gaging position. It is possible to clamp the platform table securely at any height which is most practical when gaging a bore for out-of-round errors.

For permitting the gaging of workpieces of large external dimensions, the vertically adjustable horizontal arm for holding the bore gage may be swivelled around its longitudinal axis by  $45^\circ$  and  $90^\circ$ .

Throat depth of horizontal arm .....	1 $\frac{3}{4}$ "
Diameter of platform table .....	2 $\frac{3}{8}$ "
Travel of platform table .....	1 $\frac{1}{8}$ "
Maximum working height approximately .....	4"
Weight .....	11 $\frac{1}{2}$ lbs.

Mahr

# SELF-CENTERING BORE GAGES

## No. 844A Mahr Selfcentering Bore Gage

Ranges .700" to 6.400", with supersensitive comparator gaging heads, reading directly in .000020", .000050", .0001" or .0005".

### With Right Angle Shaft

For the measuring of bores at hard-to-get-at places.

**Construction** is the same as for No. 844 Selfcentering Bore Gages described on page 27. This model is available in the following ranges:

### Specifications:

Range	.700"-1.400"	1.400"-2.400"	2"-4"	4"-6.4"
Length of shaft	2.8"	3"	4"	4"
Length of right angle shaft	2"	2.4"	3"	3.6"
Maximum bore depth	1.2"	1.4"	2"	2.2"

Each set is furnished in black hardwood case but **without** comparator gaging head. Select Precision Comparator from pages 8-9 or select dial indicator from pages 10-11.

Mahr Precision Comparators and Dial Indicators are interchangeable in the various ranges specified above. Each gage will therefore meet **all** tolerance specifications.

METRIC ranges available.

### Tungsten Carbide:

On request, we will furnish the interchangeable measuring anvils as well as the built-in sensitive anvil tipped with TUNGSTEN CARBIDE. Specify "TUNGSTEN CARBIDE," if desired, and refer to respective price specification in price list.

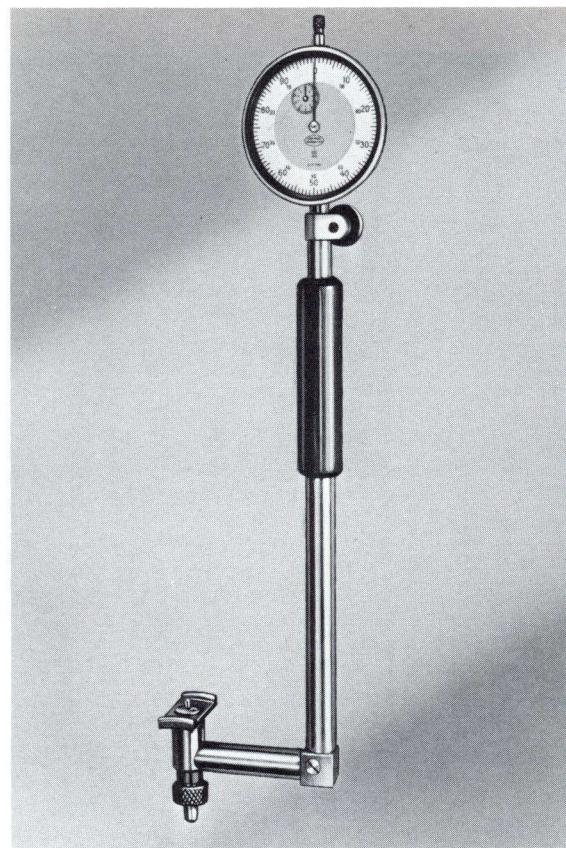


Fig. 15



Fig. 16



Fig. 17

This gage may be successfully adapted for many special measuring applications such as dovetail ways, grooves, recesses and bearing races by using segments made to specifications for the job (see fig. 17).

For thread segments refer to No. 705Vm on page 38.

## No. 844V Indicating Plug Gage

Ranges .080" to 4.800", with interchangeable measuring segments, and with supersensitive comparator gaging heads reading in .000020", .000050", .0001" or .0005".

Here is an **adjustable Plug Gage** which accomplishes inspection of the highest accuracy for Go and NoGo in **ONE** operation. The measuring device consists of three flat measuring segments, two of which are fastened to the gage body, while the third one in center can be moved between the two outer fixed segments by a thumb lever. With the segments contacting the work only after placing it in measuring position, there is practically no wear and segments have an almost unlimited life as compared to fixed gages. **MOST EFFICIENT** measuring process. The instrument is automatically centered by the two fixed measuring blades and checks the bore automatically, showing deviations from the true size instantly on the indicator. Out-of-round can be detected by revolving the gage inside the bore. Setting can be done with standard ring gages.

### Specifications:

Specifications: No. 844V Indicating Plug Gage.

Measuring range:

.080"-.200" .200"-1.030" 1.030"-2.050" 2.050"-4.800"

including black hardwood case, but **without** measuring segments and **without** comparator gaging head. Select Precision Comparator from pages 8-9. Select Measuring Segments from the following specifications.

No. 844Vm Interchangeable Measuring Segments, each set consisting of 3 pieces.

Range	Length	Range	Length	Range	Length	
.080" to .100"	5/32"	.400" to .480"	5/8"	1.620" to 1.810"	1-3/4"	
.100" to .130"	5/32"	.480" to .600"	3/4"	1.810" to 2.050"	1-3/4"	
.130" to .160"	3/16"	.600" to .720"	1"	2.050" to 2.370"	2"	
.160" to .200"	1/4"	.720" to .880"	1-1/4"	2.370" to 2.680"	2"	
.200" to .260"	5/16"	.880" to 1.030"	1-7/16"	2.680" to 3.000"	2-3/8"	
.260" to .320"	3/8"	1.030" to 1.220"	1-9/16"	3.000" to 3.300"	2-3/8"	
.320" to .400"	1/2"	1.220" to 1.420"	1-9/16"	3.300" to 3.600"	2-3/8"	
			1.420" to 1.620"	1-3/4"	3.600" to 4.000"	2-3/8"

Metric Available.

Mahr

## BORE MEASURING INSTRUMENTS

## No. 844B Over-the-Bar Bore Measuring Instrument

For inside measurements without removing the boring bar or grinder spindle from the bore.

The construction of this instrument is identical with our Bore Gages No. 844 (page 27). It has a selfcentering action in the bore at right angles to the axis. By means of a spring loaded bridge, the ends form an equal-sided triangle with the fixed anvil. Setting to standard ring gages or our Setting Device No. 844EV (page 28) is a fast and simple procedure.

This Bore Measuring Instrument will report most accurately the progress of boring without disturbing the machine set-up, and the enlarging of a bore to the exact size desired is easily accomplished. When taking the measurements it is not necessary to remove the bar from the bore.

We recommend the use of our Comparator No. 100Z or Dial Indicator No. 811ST with this instrument, for reading in .0005".

## Specifications: No. 844B

Measuring range 1.400"-4.400" 4"-8"

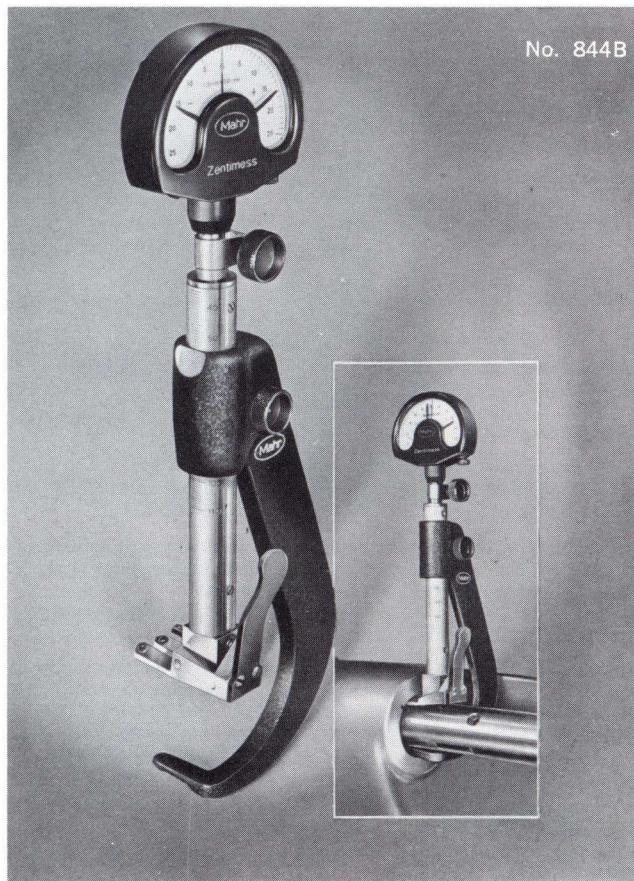
Reach of jaws into bore .....  $\frac{5}{8}$ "  $\frac{3}{4}$ "

Minimum diametrical difference between bore and boring bar ..... -.400" -1.200"

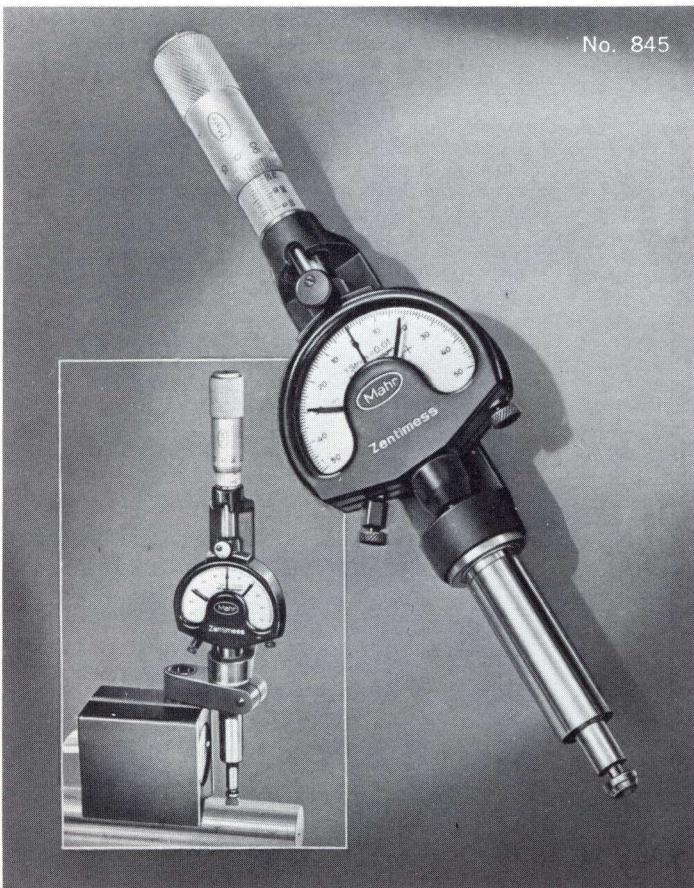
including black finished hardwood case but without gaging head.

Select Precision Comparator from pages 8-9 or select Dial Indicator from pages 10-11.

METRIC available.



No. 844B



No. 845

## No. 845 Boring Tool Setting Device

With satin chrome finished micrometer head and Precision Comparator reading in .0005" or .000050". Measuring anvil tungsten carbide tipped.

This tool is used for the rapid setting of the boring tool bit to the exact bore diameter on boring mills and other machine tools with rotating boring bars.

It is fastened with its mounting shank in a radial position with respect to the boring bar. The comparator may be moved radially by means of the micrometer. The distance between the face of the measuring anvil when set against the cutter bit, and the center of the boring bar equals  $\frac{1}{2}$  of the boring diameter. The divisions of micrometer and comparator are graduated in such a way that the bore diameter rather than the radius is read and set directly.

## Specifications: No. 845 Boring Tool Setting Device.

Measuring range in terms of the diameter ..... 2"  
Length of mounting shank ..... 2"  
Diameter of mounting shank ..... .590"

By moving the tool on the mounting shank of 2" length, the measuring range may be increased to 4".

Including wooden case.

If the device is not fastened to the machine but is to be fastened directly on the boring bar for setting (as shown in insert), we can supply as follows:

## No. 845M Magnetic Base

With accurately ground Vee for boring bar diameter from  $\frac{3}{4}$ " to  $4\frac{3}{4}$ ".

This base has a mounting device for the tool No. 845 and is securely held to the boring bar by the permanent magnet, namely that the carbide tipped contact pin is above the boring bit.

METRIC available.

Mahr

## INDICATOR TESTING MACHINES

## No. 865 Testing Machine

For Dial Indicators and Comparators.

This instrument serves for testing of dial indicators and comparators over their entire measuring range. In addition to checking the measuring accuracy, backlash can be reliably determined.

## Construction:

The measuring anvil of the Testing Machine is raised and lowered by an accurate micrometer screw which is sliding back and forth without rotating and is operated by a hand-wheel acting through a pair of mitre gears. The spindle of the micrometer screw is hardened and accurately ground and has a built-in compensating curve for any pitch errors not yet eliminated. At the scale window graduations of .000050" can be read. The underside of the barrel has accurately adjusted notches which provide rapid inspection of dial gages over their entire travel in the coarse range. This mechanism may be disengaged by the lever on the left of the machine. All moving parts are satin chrome finished.

The bracket has a bore for mounting shanks of 1.1025" diameter. Adapter bushings for indicator shanks of .315" diameter are optionally available. Bushings for other mounting shanks can be supplied to order.

## Specifications:

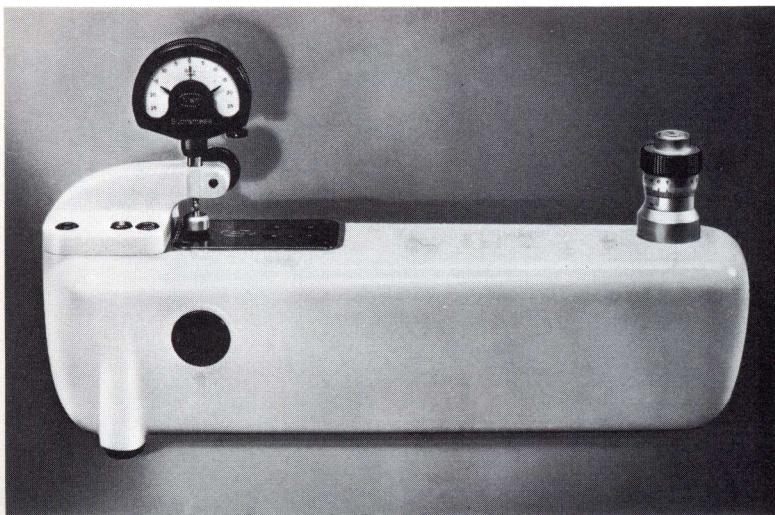
No. 865 Testing Machine

Directly reading in .....	.000050"
Measuring accuracy .....	±.000050"
Measuring range .....	.400"
Vertical range of bracket .....	2"

METRIC available.



No. 865



No. 865S



Repair and Spare Parts in stock.

## No. 865S Testing Machine

For testing Comparators of highest accuracy.

Within an attractively shaped, extremely sturdy and rigid bed there is a double lever, completely shielded from penetration of dust and dirt. Its pivot rests in special ball bearings, free from play. Its long lever arm is engaged by a micrometer screw. The movements of the micrometer screw are transferred from the short lever arm of the double lever over a linkage rod moving in a reed suspension to the comparator to be tested. Thus the accuracy of the comparator can be checked from one division to the next.

The micrometer head reads in **5 millionths** and has a ratchet system for rapid testing of the comparators in steps of .0002". This mechanism can be disengaged by a lever.

The bracket will accommodate comparators with a mounting shaft of .315" diameter. An additional bracket and bushing is optionally available for the mounting of comparators with 1.1025" and 1.181" shaft diameter.

## Specifications:

No. 865S Testing Machine for Comparators.

Directly reading in .....	5 millionths of an inch
Measuring range .....	.004"
Measuring accuracy .....	±.000005"

METRIC available.

## UNIVERSAL MEASURING MACHINE

## No. 828 Universal Measuring Machine

For OUTSIDE and for INSIDE measurements, as well as for gaging of EXTERNAL and INTERNAL THREAD.

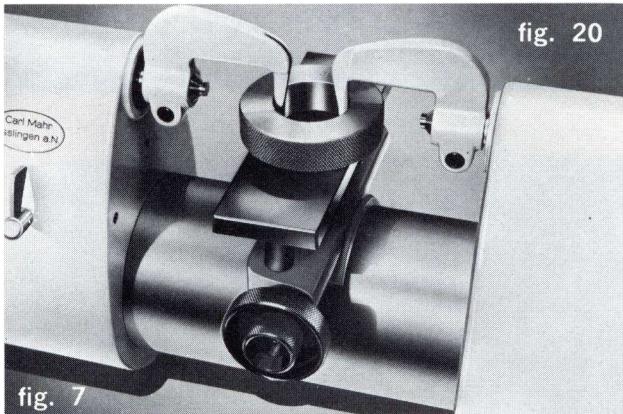
**Construction:**

An extremely precise-made, oversize guide cylinder carries a fixed measuring head with built-in feeler point which is suspended free from play and friction. This feeler point transfers the measuring motion in a straight line to the comparator which is mounted in the measuring head. This principle assures utmost measuring accuracy. The comparator is interchangeable. In place of a mechanical comparator, other types of indicating instruments, as for instance electric comparators with built-in limit contacts for mass production gaging, or electronic cartridges for extremely high measuring discrimination, can be inserted. The mounting bore is .375" (AGD).

The adjustable measuring head can be moved by handwheel. It carries a large size ultra-precision Micrometer head for parallax-free reading of .0001". The tungsten carbide tipped measuring faces are lapped accurately plane and parallel. This permits measuring of cylindrical as well as flat work with sides parallel to each other. **The measuring pressure is instantly adjustable from 2 oz. to 48 oz.**

**Operation:**

The Universal Measuring Machine is a comparison instrument. It is set to gage blocks. The range of the micrometer head is .500". Thus only a few gage blocks in steps of .500" are needed for setting the measuring machine. Setting and measuring procedure are simple and fast. Coarse adjustment is done by moving the adjustable measuring head. Fine adjustment to be made on the micrometer head and comparator.

**Internal Measurements**

With the aid of measuring jaws as per fig. 20, the Universal Measuring Machine is an excellent instrument for precision gaging of bores, especially ring gages and setting rings.

In addition to bores, plane and parallel internal surfaces can be measured. For internal measuring, the direction of measuring pressure is reversed by the lever on the front side of the fixed measuring head (fig. 7).

**Measuring of Bores (No. 828i Measuring Jaws)**

For measuring of bores, a pair of jaws No. 828i with ball tips are mounted over the anvils. Setting of the machine can be accomplished with ring gages or gage block set-up. Measuring range when used with jaws No. 828i .400" to 8 3/4".

**Measuring the Distance between Plane and Parallel Internal Surfaces (No. 828p Measuring Jaws)**

For measuring of the distance between plane and parallel internal surfaces a pair of jaws No. 828p is used in combination with the internal jaws No. 828i. These jaws have, for alignment of the internal surface, to be measured at right angle to the measuring axis, two ball faces (distance 1/4"). Measuring range when used with the internal jaws No. 828i and 828p from .400" to 8 3/4".

**No. 828t Support Table**

As an optional accessory, an adjustable table 2" x 6", with a vertical movement of 1 1/2", is available for supporting the work.

Nr. 828

SUPER ACCURATE

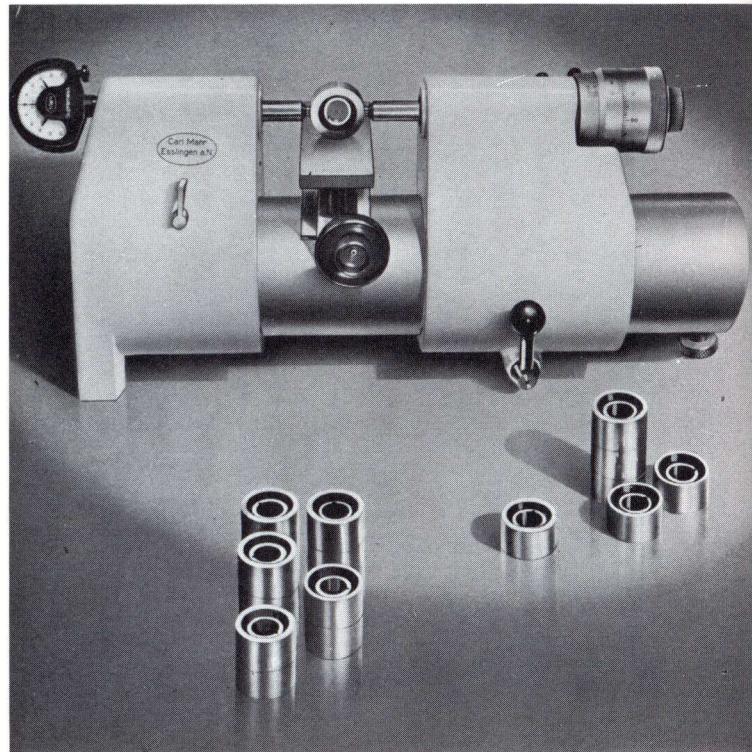
in Performance

SIMPLICITY

in Operation

RUGGEDNESS

in Design

**Specifications:****No. 828 Universal Measuring Machine**

Graduation on Micrometer head .....	.0001"
Range of Micrometer head .....	0-.500"
Graduation on "Supramess" Comparator .....	.000020"
Total measuring range .....	0-12"
Measuring Pressure instantly adjustable from .....	2 to 48 oz.

The following accessories are available:

**No. 828t Support Table**

Height adjustable by handwheel. Dimensions 2" x 6", vertical movement 1 1/2".

**No. 828i Inside Measuring Jaws**

Fig. 20, measuring range .400"-8 3/4".

**No. 828p Inside Measuring Jaws**

For measuring between plane and parallel internal surfaces. Measuring range .400"-8 3/4".

**No. 828e Collar Adapters**

For external thread measuring (fig. 22), to hold interchangeable measuring anvils. The measuring range when using these adapters is 0"-10".

**No. 828g Inside Measuring Jaws**

For internal thread measuring (fig. 23), to hold interchangeable thread measuring anvils. The measuring range with these jaws is 1"-9 1/2".

**No. 852v Thread Measuring Anvils**

For measuring external thread, 60° thread angle, one pair for each pitch required.

**No. 855 Thread Measuring Anvils**

For measuring female thread, 60° thread angle, one pair for each pitch required.

METRIC version available.

Mahr

## UNIVERSAL MEASURING MACHINE

## The No. 828 Universal Measuring Machine

described on page 32, can be adapted with suitable accessories for the gaging of External and Internal Threads:

## Measuring of external thread with thread measuring wires:

Holders with measuring wires #41 for the three wire thread measuring method may be attached to the anvils of the measuring machine (fig. 24). Refer to page 40.

Measuring of external thread with thread measuring anvils #828e Collar Adapters:

For measuring external threads with interchangeable thread measuring anvils, collar adapters #828e are available (fig. 22). They have bores for inserting interchangeable thread measuring anvils with shortened sides #852v. For information on measuring anvils refer to page 36, right hand, bottom. For every pitch a separate pair of anvils is necessary.

Measuring range with use of collar adapters 0-10".

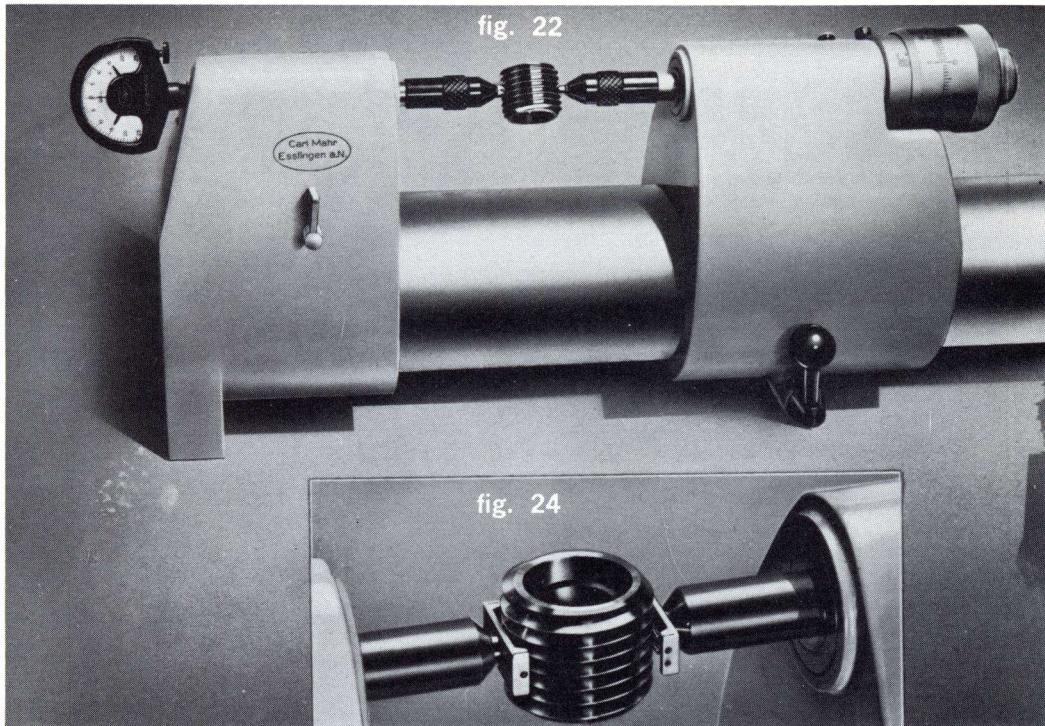


fig. 22

fig. 24

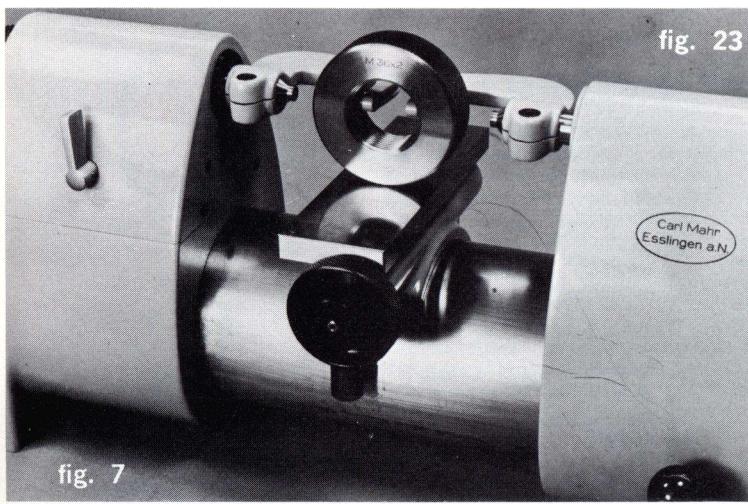


fig. 23

Measuring of internal thread with thread measuring anvils No. 828g Measuring Jaws.

For measuring of female threads a pair of measuring jaws can be furnished as illustrated (fig. 23). They have bores for inserting interchangeable thread measuring anvils No. 855. For information on measuring anvils refer to page 35 (bottom). For every pitch a separate pair of anvils is necessary.

Measuring range when measuring jaws No. 828g are used ..... 1"-9½".

*Outstanding features of  
No. 828 Mahr Measuring Machine*

Observe convenient lever (fig. 7) for rapid retraction of movable anvil. The anvil is under predetermined measuring pressure, aiding the measuring procedure by eliminating "feel" of operator. There is no backlash in the transfer movement to the gaging head. The absence of force minimizes wear of measuring faces and speeds up inspection a great deal.

This lever (fig. 7) also serves for changing measuring direction to make the Universal Measuring Machine suitable for OUTSIDE MEASUREMENTS as well as for INSIDE MEASUREMENTS. Accessories are available to convert the instrument for gaging of OUTSIDE and INSIDE THREADS and for PARALLEL SURFACES such as in Snap Gages.

**The measuring pressure is instantly adjustable from 2 oz. to 48 oz.**

The large Micrometer Head with non-rotating spindle guarantees an accuracy of .0001" over its full measuring range under constant use. It can be locked. The vernier can be rotated by 90° to place it in easy viewing position of the operator.

Direct reading can be taken from the "Supramess" Comparator in

**20 MILLIONTHS of an inch.**

This Comparator is interchangeable with No. 1003Z "Millimess" Comparator, reading in 50 millionths or No. 500Z "Compramess" Comparator, reading in .0001", electric Comparators with built in contacts (see pages 12-15) for mass production gaging, or Electronic Cartridges for extremely high measuring discrimination.

Mahr

## MULTI-PURPOSE MICROMETER

## No. 40Z Multi-Purpose Micrometer

With interchangeable measuring anvils. Sturdy satin chrome finished construction. Spindle hardened throughout, measuring screw most accurately ground, reading in .0001" with clamp ring and ratchet stop.

Since the measuring anvils are interchangeable, the MAHR Multi-Purpose Micrometer provides a

Screw Thread Micrometer  
 Blade Type Micrometer  
 Ball Anvil Type Micrometer  
 Conventional Micrometer  
 Special Application Micrometer

} all in one instrument

Anvil and spindle of the MAHR Multi-Purpose Micrometer are provided with very accurate bores into which the interchangeable anvils are inserted. They are held securely by means of snap ring, but may still be rotated. The rear plane faces of the anvils rest against hardened steel spheres which have been pressed into the bores of anvil and spindle.

Zero setting is accomplished quickly and accurately by an ingenious adjustment on the anvil side. The anvil can be adjusted approximately .060" and then secured by locknut. For the setting of micrometers larger than 1", our thread standards #43Z may be used.

## Specifications:

No. 40Z Multi-Purpose Micrometer, reading in .0001"  
 Range: 0"-1" 1"-2" 2"-3" 3"-4" 4"-5" 5"-6"  
 6"-7" 7"-8"

Without interchangeable anvils. Select anvils from specifications on bottom of page.

For sizes 0—12", the Indicating Micrometers No. 40T (see page 4) can be furnished with bores in spindle and anvil for inserting interchangeable measuring anvils (use catalog No. 40TZ).

For larger sizes we can furnish  
 No. 40WZ Micrometer or  
 No. 40UZ Micrometer with Dial Indicator  
 as described on page 40, but provided with standard bores on spindle and anvil for inserting interchangeable measuring anvils.

Measuring range: 8"-12" 12"-16" 16"-20"  
 20"-24" 24"-28"

Metric available



Fig. 2



Fig. 3

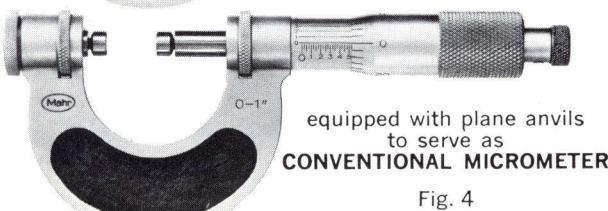


Fig. 4

All anvils are interchangeable in ALL sizes, namely from 0"—28" range.



## INTERCHANGEABLE ANVILS FOR MULTI-PURPOSE MICROMETER No. 40Z

These anvils are carefully hardened, aged and accurately ground to an accuracy that permits 180° rotation.

The form of the anvils is tested by optical methods.

## For measuring pitch diameters:

No. 40Z fm. for metric threads (60°)



No. 40Z fw. For Whitworth threads (55°)



No. 40Z fUST. For American threads (60°)



No.	I	II	III	IV	V	VI
Pitch . . . mm	0.5-0.7	0.75-1	1.25-1.75	2-3	3.5-4.5	5-6

No. 40Z fm. for metric threads (60°)



No. 40Z fw. For Whitworth threads (55°)



No. 40Z fUST. For American threads (60°)



No. 40Z fm. for metric threads (60°)



No. 40Z fw. For Whitworth threads (55°)



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No. 40Z fm. for metric threads (60°)



No. 40Z fw. For Whitworth threads (55°)



No. 40Z fUST. For American threads (60°)



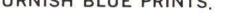
No. 40Z fm. for metric threads (60°)



No. 40Z fw. For Whitworth threads (55°)



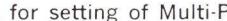
No. 40Z fUST. For American threads (60°)



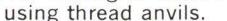
No. 40Z fm. for metric threads (60°)



No. 40Z fw. For Whitworth threads (55°)



No. 40Z fUST. For American threads (60°)



No. 40Z fm. for metric threads (60°)



No. 40Z fw. For Whitworth threads (55°)



No. 40Z fUST. For American threads (60°)



No. 40Z fm. for metric threads (60°)



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No. 40Z fUST. For American threads (60°)



No. 40Z fm. for metric threads (60°)



No. 40Z fw. For Whitworth threads (55°)



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No. 40Z fUST. For American threads (60°)



No. 40Z fm. for metric threads (60°)



No. 40Z fw. For Whitworth threads (55°)



No. 40Z fUST. For American threads (60°)



No. 40Z fm. for metric threads (60°)

Mahr

## INSIDE THREAD GAGES

## No. 44FZ Inside Micrometer

For thread measurements, with interchangeable anvils. Satin chrome finished, spindle hardened throughout, measuring screw most accurately ground, readings in .001".

The construction is identical with our No. 44F described on page 41 except that these micrometers are provided at both ends with very accurate bores into which interchangeable anvils are inserted. Thus they provide for measuring of inside screw threads for pitch, major and minor diameters from 3" upward. The anvils are held securely by means of snap ring, but may still be rotated. The rear plane faces of the anvils rest against hardened steel spheres. Setting is done with thread ring gages or No. 40Z Multi-Purpose Micrometers. One of the measuring heads provides a clamping nut for readjustment.

## Specifications:

No. 44FZ, measuring range 3-4" and so on, increasing by 1" up to 20".

without case.



For measuring the thread pitch diameter

## Interchangeable Anvils

in sizes as follows are available:

No. 44FZfm For metric thread (60°)

No.	III	IV	V	VI
-----	-----	----	---	----

for 1.25-1.75 2-3 3.5-4.5 5-6 mm pitch

No. 44FZfw For Whitworth threads (55°)

No. 44FZfust For American Threads (60°)

No.	7	8	9	10
-----	---	---	---	----

for 14-10 10-7 7-4.5 4.5-3 threads per inch

For measuring the **major diameter** of the female thread every pitch requires a special V-anvil. The pointed anvil may be used for several pitches within the above mentioned ranges.

For measuring the **minor diameter** a pair of anvils with half round faces are used.

## No. 44Z Precision Inside Thread Micrometer

with interchangeable anvils. Micrometer satin chrome finished, with hardened and ground lead screw of 1/40" pitch, graduation .001".

These micrometers are designed primarily for measuring pitch diameter in female threads. Since the anvils are interchangeable, it is likewise possible to check outside and root diameters with appropriately shaped anvils.

The two measuring jaws have bores of 3.5mm diameter into which the anvils are inserted. The anvils have a snap ring on their shaft, which holds them securely, but capable of being rotated, inside the bore. The micrometers are set to thread ring gages or to micrometers No. 40Z (page No. 34). For that purpose the left measuring jaw has a fine adjustment screw.

## Specifications:

No. 44Z

Measuring range 1"-2" 2"-3"  
including wooden case

For measuring of pitch diameter interchangeable thread measuring anvils for the micrometers are supplied in steps as listed below:

No. 44Zfm For metric thread (60°)

No.	III	IV	V	VI
-----	-----	----	---	----

for 1.25-1.75 2-3 3.5-4.5 5-6 mm pitch

No. 44Zfw For Whitworth Thread (55°)

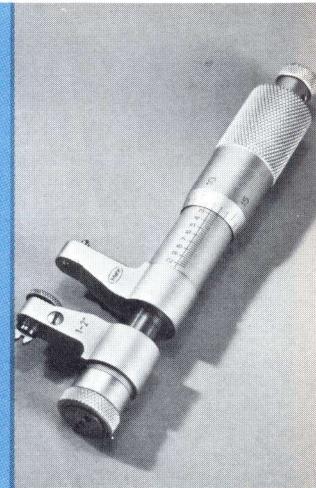
No. 44Zfust For American Thread (60°)

No.	7	8	9	10
-----	---	---	---	----

for 14-10 10-7 7-4.5 4.5-3 threads per inch

For measuring the outside diameter of the female thread a separate V-anvil is necessary for each pitch. The pointed anvil can be used for several pitches, as listed in the range specifications above.

For measuring of the inside or minor diameter, a pair of anvils with spherical measuring faces is used.



## Specifications: No. 855

Measuring range 1"-3" 1"-6" 1"-10"

Throat depth

either	3/8"	1"	1"
--------	------	----	----

or

1"	2"	2"
----	----	----

in case but without dial indicator.

Similar gages equipped with ball anvils for measuring short cylindrical bores (Cat. No. 844E), also with special measuring anvils for gaging of grooves, can be furnished; also equipped with interchangeable cylindrical measuring pin anvils for gaging of internal splines (Cat. No. 844EM). Quotation on request.

This gage is primarily designed for checking the **pitch diameter**. Since the anvils are interchangeable, major and minor diameters can be checked as well by use of appropriately shaped anvils.

By pressing the button on the upper jaw, the two jaws can be brought together so far that they can be inserted into the thread and withdrawn. All measurements are performed at uniform measuring pressure independent from the personal feel of the operator.

The gage is set to ring gages or thread micrometers.

For measuring of the pitch diameter, **interchangeable thread measuring anvils** are supplied for this gage in steps as listed below:

No. 855fm For metric threads (60°)

No.	III	IV	V	VI
-----	-----	----	---	----

for 1.25-1.75 2-3 3.5-4.5 5-6 mm pitch

No. 855fw For Whitworth threads (55°)

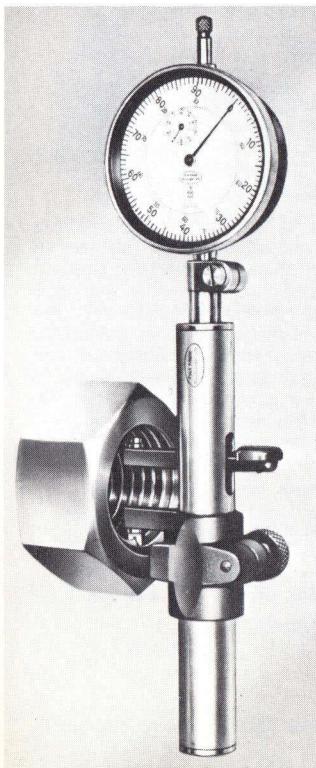
No. 855fust For American threads (60°)

No.	7	8	9	10
-----	---	---	---	----

for 14-10 10-7 7-4.5 4.5-3 threads per inch

For measuring the outside or major diameter of female threads a separate V-anvil is necessary for each pitch. The pointed anvil can be used for several pitches, as specified above.

For measuring the minor diameter anvils with spherical measuring faces are used.



## No. 855 Inside Thread Gage

With interchangeable thread measuring anvils, readings in .0005", using dial indicators or comparator "Zentimess" for direct reading of the dimensions in female threads. For insertion into the thread it has two measuring jaws, of which the upper one is connected to the spindle of the indicator under spring tension by a plunger moving inside the tube. The lower jaw is rigidly fastened to the tube by its holding sleeve during measuring; however it can be adjusted alongside the tube upon loosening of the clamping screw.

Both jaws are made short and stable; they cannot bend in any direction. At their ends there are openings for the interchangeable measuring anvils which are inserted and held securely, though they can be rotated.

## INDICATING THREAD SNAP GAGES

## No. 852 Indicating Snap Gage

With interchangeable anvils. With super sensitive comparator gaging heads, reading in 20 millionths, 50 millionths, tenth, or  $\frac{1}{2}$  thousandth of an inch.

The construction is identical with our No. 840F Snap Gages (refer to page 6). These gages have a lever on back of frame for rapid retraction of moveable anvil.

Anvil and spindle are provided with very accurate bores into which the interchangeable anvils are inserted. They are held securely by a snap ring but may still be rotated. The rear plane faces of the anvils rest against hardened steel spheres which have been pressed into the bores of anvil and spindle. Setting is accomplished with master thread gages or gage blocks respectively.

## Specifications: No. 852

range: 0"-1 $\frac{3}{4}$ " 1 $\frac{3}{4}$ "-3 $\frac{3}{8}$ " 3 $\frac{3}{8}$ "-5 $\frac{1}{2}$ " 5 $\frac{1}{2}$ "-7 $\frac{1}{2}$ "

All sizes are furnished in finished hardwood case which provides space for anvils, but without comparator gaging heads and without anvils.

Select Precision Comparator from pages 8-9.

Select interchangeable anvils from specifications on bottom of this page.

If desired for METRIC, select comparator graduated in millimeters and select metric thread anvils.

## INTERCHANGEABLE ANVILS for Snap Gages No. 852

These anvils are carefully hardened, aged and accurately ground to an accuracy that permits 180° rotation. The form of the anvils is tested by optical methods.

## For measuring pitch diameters:

No. 852 fm. for metric threads (60°)



No.	I	II	III	IV	V	VI
Pitch . . . mm	0.5-0.7	0.75-1	1.25-1.75	2-3	3.5-4.5	5-6

No. 852 fw. For Whitworth threads (55°)

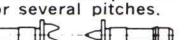
No. 852 fUST. For American threads (60°)

No.	1	2	3	4	5	6	7	8	9	10
Threads per inch	50-48	48-40	40-32	32-24	24-18	18-14	14-10	10-7	7-4.5	4.5-3

## For measuring root diameters:

Here every pitch requires a separate V-anvil. The pointed anvils (always by pairs) however may be used for several pitches.

No. 852 km. For metric threads



V-anvil for	0.5	0.6	0.7	0.75	0.8	0.9	1	1.25	1.5	1.75	2	2.25	3	3.5	4	4.5	5	5.5	6
mm pitch																			

Pointed anvil for	0.5-1	1.25-1.75	2-3	3.5-4.5	5-6
mm pitch					

No. 852 kw. For Whitworth threads

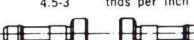
No. 852 kUST. For American threads

V-anvil for	28	20	19	18	16	14	12	11	10	9	8	7	6	5	4.5	4	3.5	3	2.5	2	thds per inch
-------------	----	----	----	----	----	----	----	----	----	---	---	---	---	---	-----	---	-----	---	-----	---	---------------

Pointed anvil for	28-18	18-14	14-10	10-7	7-4.5	4.5-3	thds per inch
-------------------	-------	-------	-------	------	-------	-------	---------------

## For measuring outside diameter:

No. 852 a. Anvils with plane faces



For checking Recesses, Grooves, Splines etc.:

No. 852b—

1 Pin Anvil & 1 Blade Anvil ....030" Blade Thickness

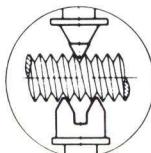
For checking Pin Measurements for Gears:

No. 852g—

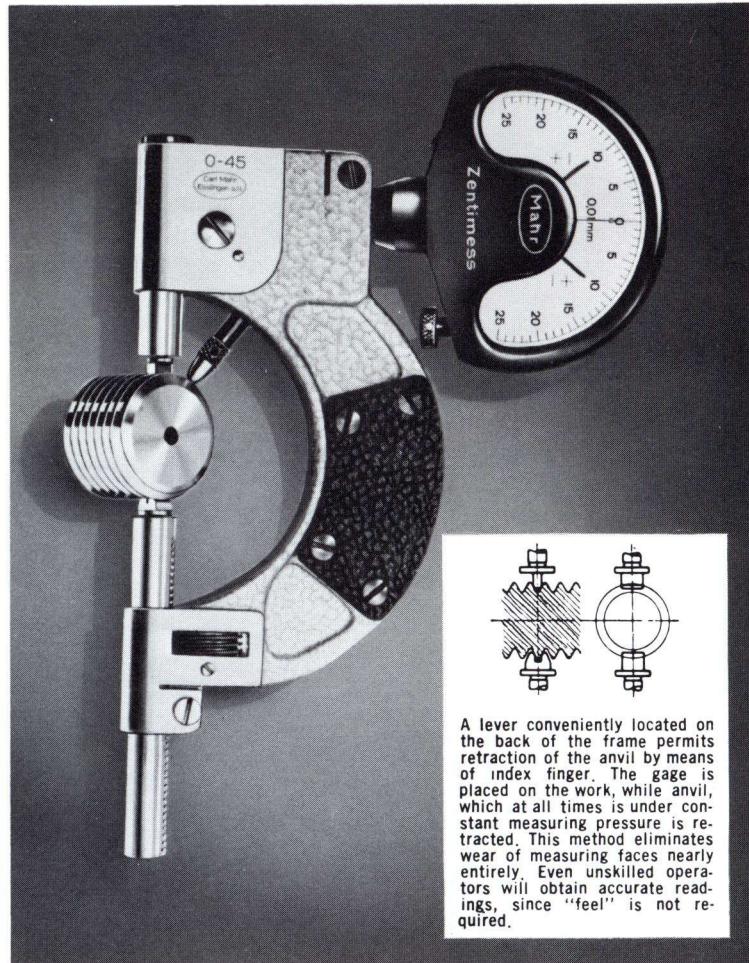
2 Ball Tips, state pitch to be checked, also available with 1 Ball Tip and 1 Roller Tip

## For Special Applications:

Special Anvils made to order. PLEASE FURNISH BLUE PRINTS.



For measuring the pitch diameter of fine pitches of 0.2, 0.25, 0.3, 0.35, 0.4, 0.45 and 0.5 mm special anvils are supplied. These anvils bridge across three threads (see sketch). Setting is done by a thread plug gauge. A separate pair of anvils is required for every pitch.



## Anvils with Shortened Sides

## For Screw Thread Snap Gage No. 852



If the angle of a screw thread is more acute or obtuse than its nominal value, the measuring results are affected, as can be seen from the sketch to the right, because the anvils do not fit properly in the thread profile.



This source of error is almost entirely eliminated by the use of anvils with shortened sides. These are supplied for metric threads from 1.5 mm pitch and for Whitworth and U S threads from 16 t. p. i. With these anvils the points of the Vees are removed, the V bottom is relieved and the point anvil is shortened and offset. In this way the anvils rest against approximately  $\frac{1}{3}$  of the flank width and may therefore be used to make measurements practically unaffected by angle errors. Measurements with these stub anvils give the most accurate results; however, a separate pair of anvils is required for every pitch.



No. 852 vfm.

For metric threads (60°)

Pitch . . . mm	1.5	1.75	2	2.25	3	3.5	4
4.5	5	5.5	6				

No. 852 vfw.

For Whitworth threads (55°)

No. 852 vfUST.

For American threads (60°)

Threads per inch	16	14	12	11	10	9
8	7	6	5	4 $\frac{1}{2}$		

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## INDICATING THREAD SNAP GAGE

## No. 853 Indicating Screw Thread Snap Gage

with interchangeable anvils, for 3 or 5 flute taps

With super sensitive comparator gaging heads, reading in 50 millionths, tenths or  $\frac{1}{2}$  thousandth of an inch. This design permits that the three measuring anvils enter the screw thread. Two of these thread anvils are mounted on a bridge cross head held by the spindle. The third thread anvil is inserted in the bore of the anvil of the snap gage which is under predetermined measuring pressure. A variation from the screw thread standard can be read from the comparator in .0005", .0001" or .000050" accurately and quickly. Separate gages are required for the measuring of 3 and 5 flute taps. For 5 flute taps (see insert) the two anvils of the lower bridge cross head should have a correspondingly more acute angle and the transmission of the upper measuring anvil movement is modified to suit this angle so that the pitch diameter can be read. Specify clearly if gages are to be used with 3 or 5 flute taps.

## Specifications: No. 853

range:  $3/16''$ - $1\frac{3}{8}''$   $1\frac{3}{8}''$ - $3''$ 

All sizes are furnished in finished hardwood case, which provides space for anvils, but without comparator gaging heads and without anvils.

Select Precision Comparator from page 8-9. Select interchangeable anvils from specifications on bottom of this page.

If desired for METRIC, select comparator graduated in millimeters and select metric thread anvils.

Tool Stand No. 41H is optionally available.

## INTERCHANGEABLE ANVILS

## for Screw Thread Snap Gauges No. 853

1 set 3 pieces for 3 or 5 flute taps

These anvils are carefully hardened, aged and accurately ground to an accuracy that permits  $180^\circ$  rotation.

The form of the anvils is tested by optical methods.

## For measuring the pitch diameter:

No. 853 fm. For metric threads ( $60^\circ$ )\*

No.	I	II	III	IV	V	VI
Pitch . . . mm	0.5-0.7	0.75-1	1.25-1.75	2-3	3.5-4.5	5-6

No. 853 fw. For Whitworth threads ( $55^\circ$ )No. 853 fUST. For American threads ( $60^\circ$ )

No.	1	2	3	4	5	6	7	8	9	10
Threads per inch	60-48	48-40	40-32	32-24	24-18	18-14	14-10	10-7	7-4.5	4.5-3

## For measuring the minor diameter:

Here every pitch requires a separate V-anvil. The pointed anvils (always by pairs) however may be used for several pitches.

No. 853 km. For metric threads

V-anvil for	0.5	0.6	0.7	0.75	0.8	0.9	1	1.25	1.5	1.75	2	2.5	3	3.5	4	4.5	5	5.5	6
Pointed anvil for	0.5-1							1.25-1.75			2-3		3.5-4.5		5-6		mm pitch		

No. 853 kw. For Whitworth threads

No. 853 kUST. For American threads

V-anvil for	28	20	19	18	16	14	12	11	10	9	8	7	6	5	4.5	4	3.5	3.25	3
Pointed anvil for	28-18							18-14			14-10		10-7		7-4.5		4.5-3	thds per inch	

## For measuring outside diameter:

No. 853 a. Anvils with plane faces

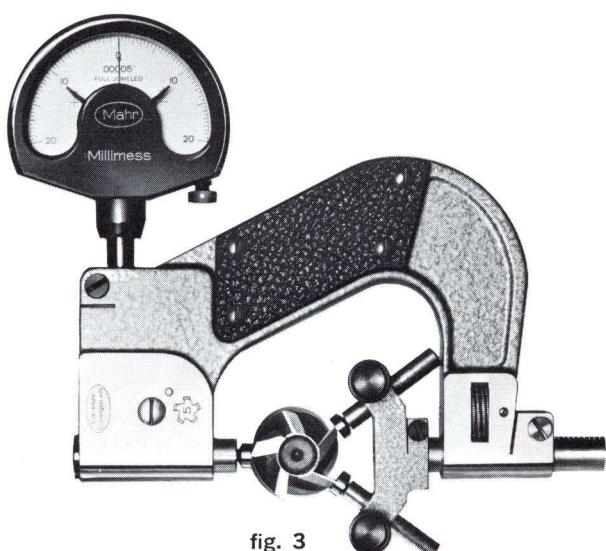
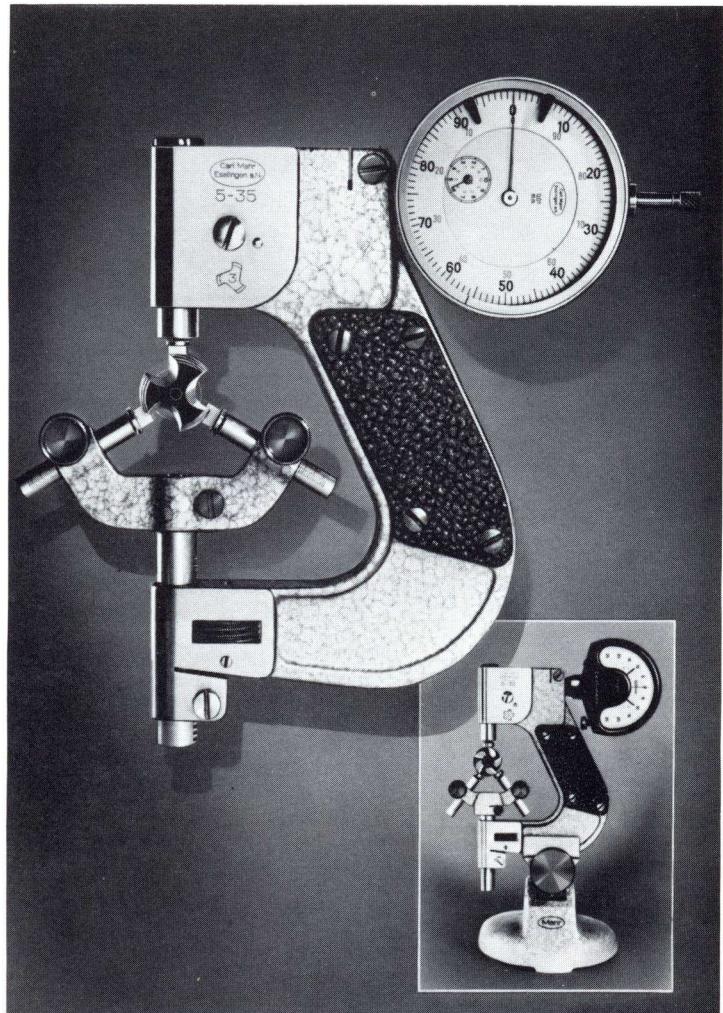


fig. 3

This illustration shows the No. 853 indicating Screw Thread Snap Gage with interchangeable anvils with plane faces for measuring the diameter of the fluted cutting tools, namely taps, reamers, end mills, cutters. Out-of-Roundness of cylindrical work can be accurately checked.

TUNGSTEN CARBIDE tipped PLANE FACE anvils are available to special order.

\*For measuring the pitch diameter of fine pitches of 0.2, 0.25, 0.3, 0.35, 0.4, 0.45 and 0.5 mm special anvils are supplied with V-anvils made to bridge across three threads (see sketch page 36). Setting is done by a thread plug gage. A separate set of anvils is required for every pitch.

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## INDICATING THREAD PLUG GAGE

## No. 705V Indicating Thread Plug Gage

With interchangeable Measuring Segments, reading in .0005", in ranges from .080" to 4.800".

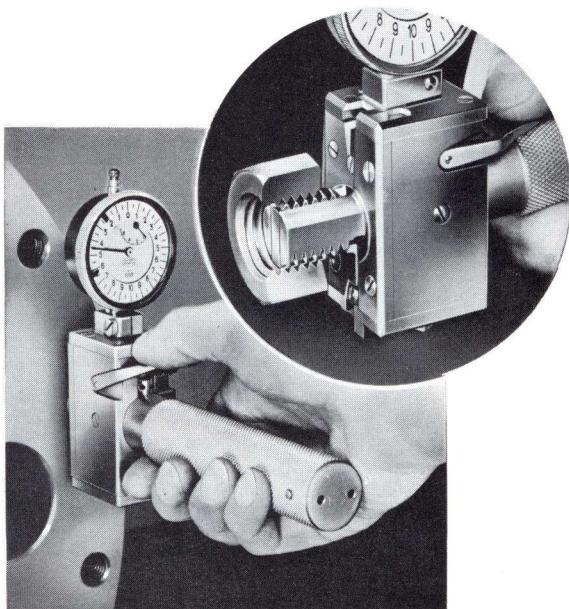
The MAHR Indicating Thread Plug Gage is an **ADJUSTABLE THREAD PLUG GAGE**.

The measuring device consists of three flat thread segments which represent a cut-up section from a GO-Thread Plug Gage, flattened on the sides. Two of the segments are fastened to the gage body while the third one in center can be moved between the two outer fixed segments by means of a thumb lever. With the center member retracted the gage is inserted into the threaded bore and centers itself automatically upon release of the thumb lever. The segments engage the thread throughout the length of the thread. The motions of the center member are transmitted to the dial indicator which tells the position of the two outer segment members at each gaging. The gage is set to the lower tolerance by a thread ring gage. If one tolerance marker is set to this measurement and the other to the upper tolerance the thread to be tested is within tolerances if the hand of the dial indicator stays between the tolerance markers.

The segments usually have the full thread profile like a GO-Thread Plug Gage. In gaging, the result is the over-all or composite of all dimensions making up the thread. Thus the error showing up on the indicator is a combination of errors in pitch diameter, thread angle, lead and profile. In gaging large quantities, it is nearly always sufficient to ascertain this composite error. The measuring segments can be designed with only one or two threads and shortened sides whereby pitch diameter alone can be gaged excluding errors in lead and profile.

Mahr Indicating Thread Plug Gages offer **greater RELIABILITY** since the measuring result can be read in numerical values and measuring feel of the operator has no influence on the gaging.

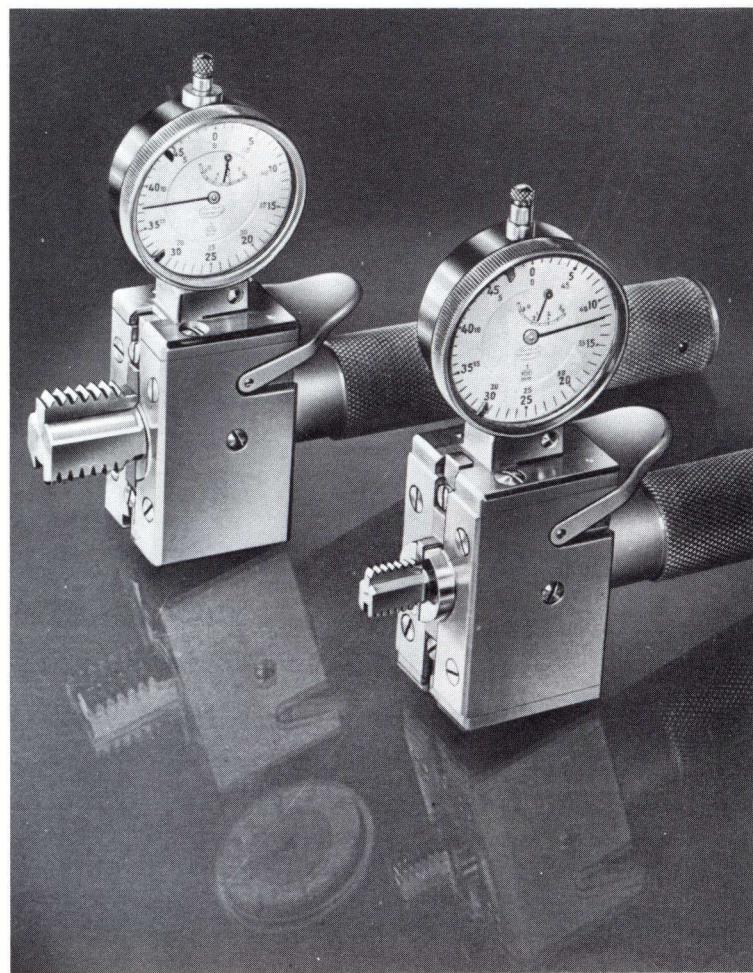
There is practically **no WEAR** since measuring faces contact work only in ultimate measuring position and insertion is not subject to friction.



Mahr Indicating Thread Plug Gages

**ELIMINATE**

threading in and threading out of Go and NoGo gages, as well as possible abuse and forcing of expensive thread gaging equipment resulting in excessive wear which makes replacement necessary.



**No. 705V Indicating Thread Plug Gage**, with interchangeable measuring segments, furnished with shockproof dial indicator No. 803STZ, reading in .0005".

Range: .080"- .200" .200"- .1.030" 1.030"- .2.050"  
2.050"- .4.800"

Including black hardwood case, but without Measuring Segments. Select Measuring Segments from the following specifications.

**No. 705Vm Interchangeable Measuring Segments**, each set consisting of 3 members.

Size	Size	Size
No. 3 - 8	1-1/4" - 1-3/8"	2-5/8" - 2-3/4"
No. 10 - 1/4"	1-7/16" - 1-9/16"	2-13/16" - 2-15/16"
5/16" - 3/8"	1-5/8" - 1-3/4"	3" - 3-1/8"
7/16" - 9/16"	1-13/16" - 2-1/16"	3-1/4" - 3-1/2"
5/8" - 3/4"	2-1/8" - 2-3/16"	3-5/8" - 3-7/8"
7/8" - 1"	2-1/4" - 2-3/8"	4" - 4-1/2"
1-1/16" - 1-3/16"	2-7/16" - 2-9/16"	over 4-1/2"

When ordering these segments, specify thread type, thread size and class.

One set consisting of 3 members is required for each thread type and each thread size.

**No. 844Vm Interchangeable Measuring Segments** with **cylindrical faces** for the measuring of smooth bores or minor diameters of nuts are available (refer to page 29).

METRIC available.

Mahr

# ROLLER THREAD COMPARATOR

## No. 706V Indicating Roller Thread Comparator

For the rapid inspection of external threads, with super sensitive comparator gaging heads reading directly in  $.000050"$ ,  $.0001"$  or  $.0005"$ .

The Indicating Roller Thread Comparator is an **ADJUSTABLE** Roller Thread Snap Gage with interchangeable Measuring Rollers, covering a range for diameters from  $.120"$  to  $2.000"$ . It indicates not only whether the inspected thread is "good" or "reject" but it clearly states the tolerance position of the work. This alerts the operator to the wear of tools enabling him to take corrective action before rejects are produced. Sorting into classes of accuracy is a simple procedure. Out-of-round can be detected by turning the work between rollers.

The sloping front of the instrument holds two roll holders. The upper (spring-loaded) holder transmits its movement free of play to the measuring spindle of the comparator. The lower holder is adjustable by micrometer screw. It may be locked by a toggle on the right hand side of the housing. The measuring rollers revolve easily with a little lengthwise play on the rigid cantilever supported axles. An adjustable stop assures the contact of the measuring rollers with the diametrical section of the work. The measuring pressure may be increased or decreased by means of a knurled screw underneath the micrometer barrel, depending on whether coarse or fine threads are to be measured.

Setting is accomplished with Thread Plug Gage.

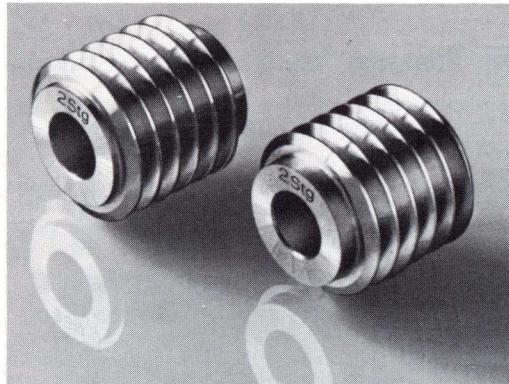
**Specifications:** No. 706V Indicating Roller Thread Comparator, range  $.120"$  to  $2.000"$  to be used with interchangeable measuring rollers.

Furnished **without** Comparator Gaging Head and **without** Measuring Rollers.

Select Precision Comparator from pages 8 and 9.

Select Measuring Rollers from following specifications.

**METRIC** available.



## No. 706Vr Measuring Rollers

A special pair of rollers is required for each type of thread and each pitch. Threads of identical pitch may be measured with the same roller pair regardless of their diameter. Right hand and left hand threads may also be tested with identical rollers. These rollers have a practically unlimited life as they are subject to very little wear.

Measuring rollers for conical threads can be made to order.

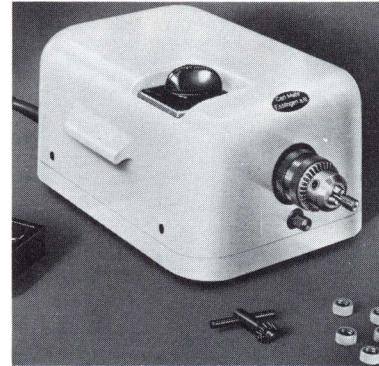
Smooth cylindrical rollers No. 706Vrg can be supplied for checking cylindrical parts.

**Specifications:** No. 706Vr Thread Measuring Rollers.

Standard sizes: 14, 16, 18, 20, 24, 32 threads per inch. Right hand and left hand threads may be tested with identical rollers.

**No. 705Vrg** Smooth cylindrical rollers, for checking of cylindrical parts.

For quantity inspection we recommend the use of our **Electric Comparators**. Refer to pages 12-15.



## No. 750 High Speed Screw Thread Inspection Instrument

**For Internal Threads up to  $3/4"$  Diameter.**

For checking internal threads in mass-produced small parts, the above instrument is a time- and cost saving device. It can also be used as a small tapping machine.

**Operation:** Pressing the work with its bore against the thread plug gage, which is held in the chuck, will actuate a friction disc, rotating the plug gage. A second friction disc is set into motion when trying to pull the work piece away from the spindle, affecting a reverse movement of the plug gage.

**Technical Data:** Furnished with built-in electric motor of .1 hp, operating on 110 Volts A.C. (Optionally available for 220 Volts A.C.). A control switch will alter forward movement from 200 rpm to 400 rpm. In reverse motion, the speeds are about 30% higher. The chuck has a clamping range from 0 - .400".

Overall length	$13\frac{3}{4}"$
width	$8\frac{3}{4}"$
height	$6\frac{3}{8}"$
weight	31 lbs.

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## MICROMETERS

## No. 40S Super Micrometer

Extra rigid, satin chrome finished with sensitive ratchet stop and clamp ring, reading in .0001" by vernier.

MAHR Super Micrometers are of extraordinary quality and workmanship. Measuring spindle is hardened throughout. Spindle diameter .300". Frames are of drop forged steel. Jet black graduations and numerals permit fast and errorless readings. Thermal insulation inserts prevent distortion by heat from hand. TUNGSTEN CARBIDE tipping of measuring anvils is **optionally** available. Micrometers over 4" have 2" measuring range, namely 1" by travel of micrometer screw and by 2 interchangeable fixed anvils differing by 1" in length.

## Specifications: No. 40S

Range: 0"-1" 1"-2" 2"-3" 3"-4" 4"-6" 6"-8"

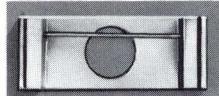
Wooden cases for these micrometers are optionally available.

Thread micrometers refer to page 34.

Disc micrometers refer to page 50.

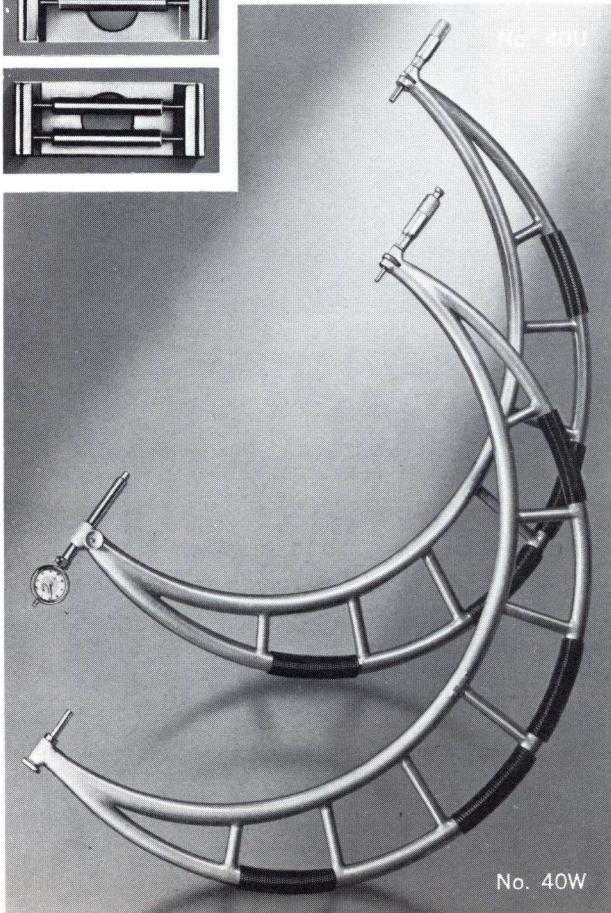
METRIC sizes available.

Complete Super Micrometer Sets for measuring ranges 0-3", 0-4", 0-6" and 0-8" are available. Request quotation



For wire measuring by the three wire method, Thread Measuring Wires with holders to fit the anvils of the No. 40S Super Micrometer can be furnished.

Each set of measuring wires consists of a holder with one wire and a holder with two wires. The holders are mounted by their bores into spindle and anvil of the micrometer. Ask for quotation.



## No. 40W Precision Micrometer

For large diameters, reading in .001". Micrometer head satin chrome finished. Other features identical with our Super Micrometer.

With ratchet stop and lock nut. Hardened and ground screw, spindle .315" diameter, spindle travel 1". Four interchangeable anvils differing by 1" in length are provided to give each micrometer a range of 4". Screw and anvil may be readily re-adjusted if worn. The frames up to 12" range are made of high grade iron castings. From 12" upward, they are made of tubular steel as illustrated. These frames are nearly as lightweight as aluminum frames without sacrificing rigidity and without their drawback with regard to thermal expansion and low strength. The micrometers are provided with thermal insulating grips.

## Specifications: No. 40W

Range: 0"-4" 4"-8" 8"-12" 12"-16" 16"-20" 20"-24"  
24"-28" 28"-32" 32"-36" 36"-40" 40"-44" 44"-48"  
48"-52" 52"-56" 56"-60"

## No. 40U Precision Micrometers with Dial Indicator

Design same as in No. 40W except that a sliding bar replaces the interchangeable anvils. The sliding bar accommodates a Dial Indicator No. 803STZ, reading in .0005" and provides uniform measuring pressure for its measuring anvil namely about 2 lbs., thus making the measuring result independent of the personal feel and skill of the operator. The sliding bar permits lengthwise adjustment of 4" and can be securely locked into position by knurled screw. The measuring anvil can be conveniently retracted by a lever.

Measuring ranges are identical as in No. 40W.

Setting standard (Micrometer Setting Standards No. 43) are listed in price list. For **thread measuring**, these micrometers can be furnished with bores in anvil and spindle for inserting interchangeable anvils. Refer to page 34. (Catalog No. 40WZ and 40 UZ.)

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# INSIDE MICROMETERS AND MICROMETER HEADS

## No. 44B Inside Micrometers

For large diameters

Micrometer satin chrome finished  
Spindle hardened throughout  
Measuring screw accurately ground



The No. 44 B Inside Micrometer consists of two telescoping tubes. One of these, accurately divided for the full, adjustable range, can be set to the precision index lines on the other and locked in place. The measurement is made with a micrometer head with clamp ring and a measuring range of 1"; its scale divisions are .001". The anvils are carefully hardened, spherically ground and lapped and may be adjusted at one end of the measuring head unscrewing the jawnut.

This Inside Micrometer has a protective plastic coating over the entire length of the outer tube to prevent thermal heat transfer from the hand. This coat also prevents corrosion of the guide tube.

### Specifications: No. 44B

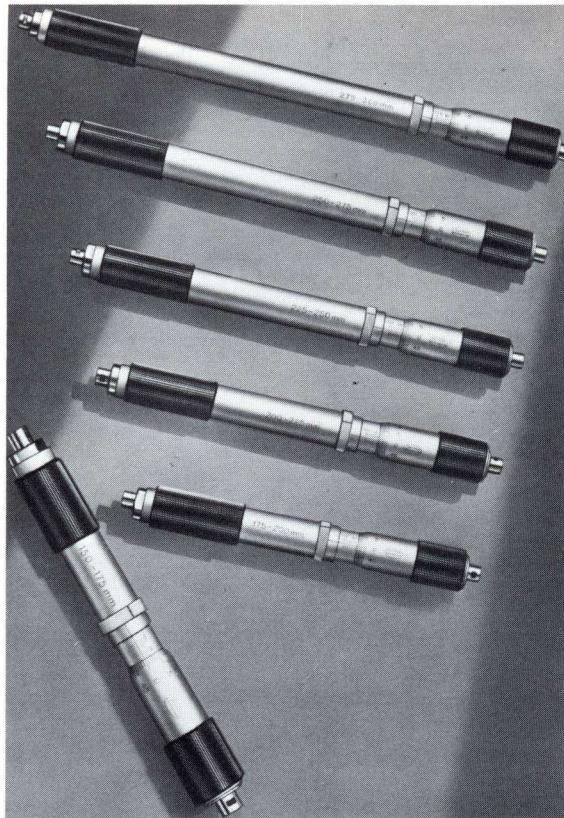
Range 12"-16" 16"-24" 24"-40"  
40"-68" 68"-100" 100"-160"  
Reading in .001"

METRIC graduation available.

### Micrometer Heads of Super Micrometer Quality



Non-Rotating  
Spindle



## No. 44F Precision Inside Micrometers

Satin chrome finished  
Spindle hardened throughout  
Measuring screw accurately ground

From 4" on up, these micrometers are provided with a clamp ring which locks the screw in the desired position by simply turning to either side. Thermal insulating grips are provided for these micrometers from 4" on up.

Lightweight and yet rigid construction is of permanent importance. Even the larger models are light enough to insure handiness and measuring accuracy. The faces are spherical, carefully hardened and lapped. The anvil pin, at one end, is threaded and provided with a jam nut. Take-up for wear of the spindle screw is made with the re-adjustable nut, as with micrometers.

### Specifications: No. 44F

Measuring range: 2"-2 3/4" 2 3/4"-4" 4"-5" and so on, increasing by 1" up to 40".  
Reading in .001".

METRIC graduations available.

## No. 40X Micrometer Heads

Of Super Micrometer quality. Sturdy, satin chrome finished construction. Spindle hardened throughout. Measuring screw accurately ground, reading in .0001".

With sensitive ratchet stop. These micrometer heads may be incorporated into machines and measuring devices of all kinds. They are supplied in the following versions:

Specifications:	No. 40X	No. 40XG	No. 40XH
With Standard Thimble	With Large Thimble	With Extra Large Thimble	
With Rotating Spindle	With Rotating Spindle	With Non-Rotating Spindle	
Reading in .....	.0001"	.0001"	.0001"
Measuring range .....	(by vernier)	(directly)	(directly)
Thimble diameter .....	1"	1"	1"
Length of mounting shank .....	11/16"	1 1/16"	1 3/4"
Diameter of mounting shank .....	5/8"	5/8"	13/16"
	.472"	.472"	.472"
METRIC graduation available.			

Mahr

## DEPTH MICROMETER AND DEPTH GAGE

## No. 45 T. Depth Micrometer

With interchangeable measuring anvils

Graduation ..... .001"  
Range ..... 4"  
Length of base ..... 4"

Standard Anvil is tungsten carbide tipped.

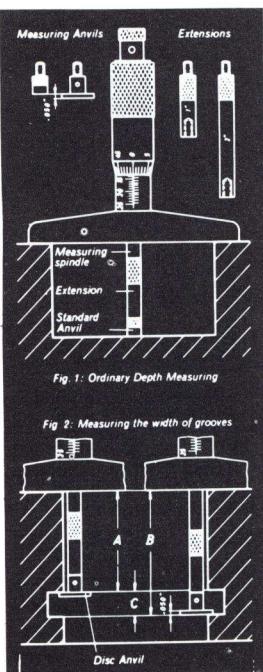
Measuring Anvils and flat surface of base fully hardened.

Thimble, barrel and base satin chrome finished.

This Depth Micrometer is equipped with interchangeable anvils and extensions, which can be combined to form any desired length. This design makes the tool very versatile, suitable for **special measuring applications** such as **width of grooves** in bores, in addition to ordinary depth measuring. The friction stop in the micrometer head works in both directions, resulting in reliable measurements at all times.

## Measuring Ranges:

With anvil only (without extensions)	0-1"
With anvil and extension 1"	1-2"
With anvil and extension 2"	2-3"
With anvil and extensions 1" plus 2"	3-4"

**Application:****Ordinary Depth Measurements (fig. 1)**

Depth Micrometer is used with **standard anvil** and—if necessary—with extensions.

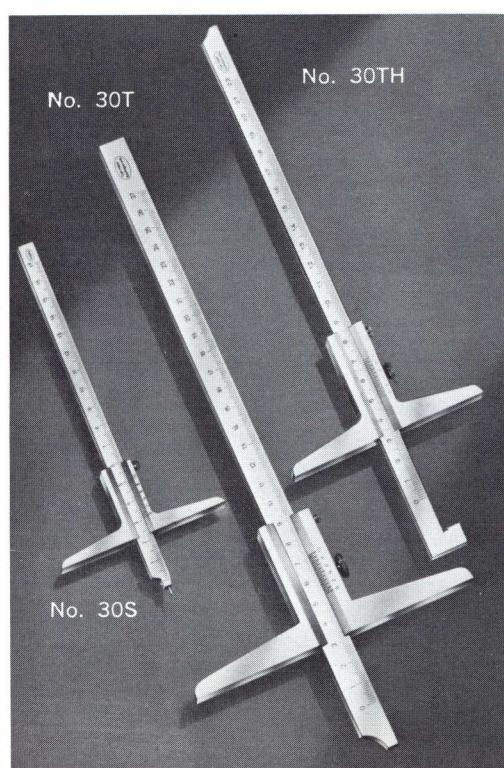
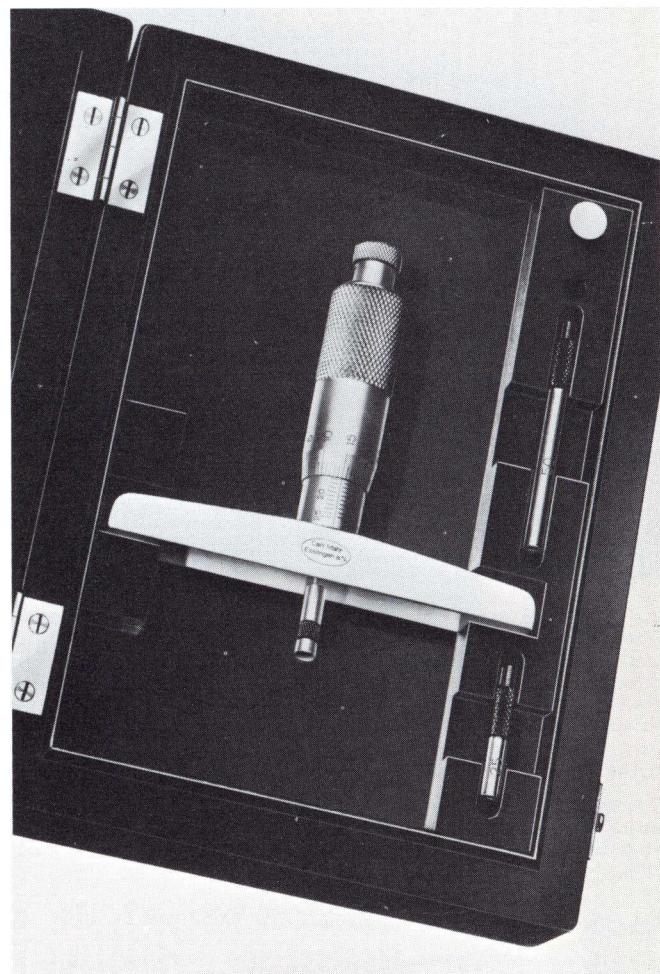
**Measuring of the width of grooves (fig. 2)**

Depth Micrometer is used with **disc anvil** diameter .35" (Cat. No. 45 Tm) to determine the distances A and B. Extensions may be inserted if necessary.

Dimension A: Can be read directly on micrometer head.  
Dimension B: The thickness of the measuring disc anvil of **.050"** must be added to the reading.

Dimension C: Is determined by subtracting A from B.

METRIC graduations available.



## No. 30 S. Depth Gage with interchangeable wire point

Extra light and convenient construction  
Scale and vernier: Readings by 1/1000"

Measuring range	6"
Length of base	3 1/8"
Cross-section of measuring rod	.320" x .100"

METRIC graduations available.

## No. 30 T. Depth Gage Made entirely from steel, with open slide

Measuring rods hardened  
Scale and vernier: Readings by 1/1000"

Measuring range ..... inches	6	12
Length of base ..... inches	3 1/8	6 1/4

METRIC graduations available.

## No. 30 TH. Depth Gages with hook rod

In this type of depth gage, the rod has a small offset tip at the end, which permits the measuring of grooves and recesses. The rod has scales on both front and back and can be reversed for ordinary depth measuring.

The model No. 30 TH Depth Gages are only available with millimeter graduations, in the following ranges:

200	250	300	500 mm
-----	-----	-----	--------

Mahr

# HEIGHT GAGE AND VERNIER CALIPERS

## No. 27Z Precision Vernier Height Gage

### Extra heavy construction

For precision measuring and layout work.

The base is of especially sturdy design. Its hardened underside is precision lapped and permits an easy, smooth sliding motion. The top is recessed for comfortable gripping.

The beam with an extra large cross section has a newly designed, extra strong attachment to the base. This guarantees utmost rigidity and protection from vibrations.

The extra long slide has most accurate guide ways and fine adjustment screw.

The scribe is hardened and lapped. Easily interchangeable, can be supplied optionally TUNGSTEN CARBIDE tipped. The design of this Height Gage permits the setting of the scribe arm to zero, eliminating an offset scribe.

**Satin Chromed** Scales and Verniers permit glare-free readings. Recessed Scale protects scale divisions against frictional damage and scratches.

**Easy to read.** The extra long vernier has 50 scale divisions; the main scale has 20 divisions to the inch, .050" wide.

**Guaranteed accurate measurements to .001".**

### Specifications:

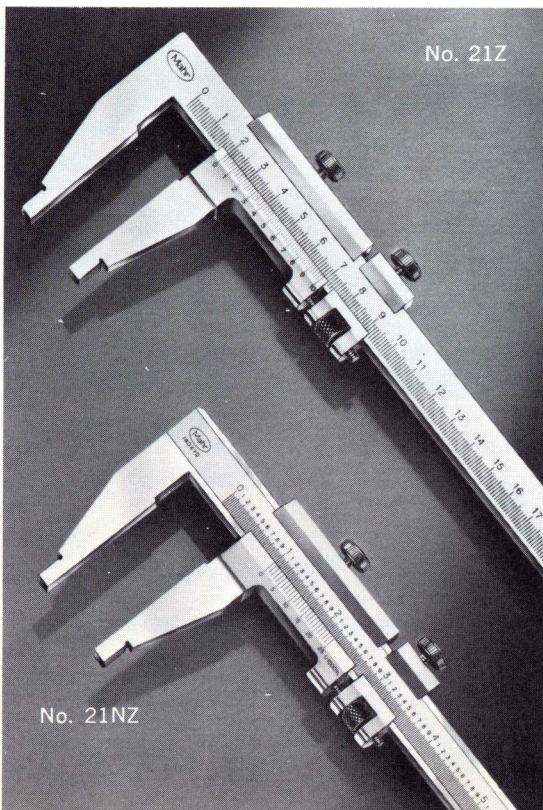
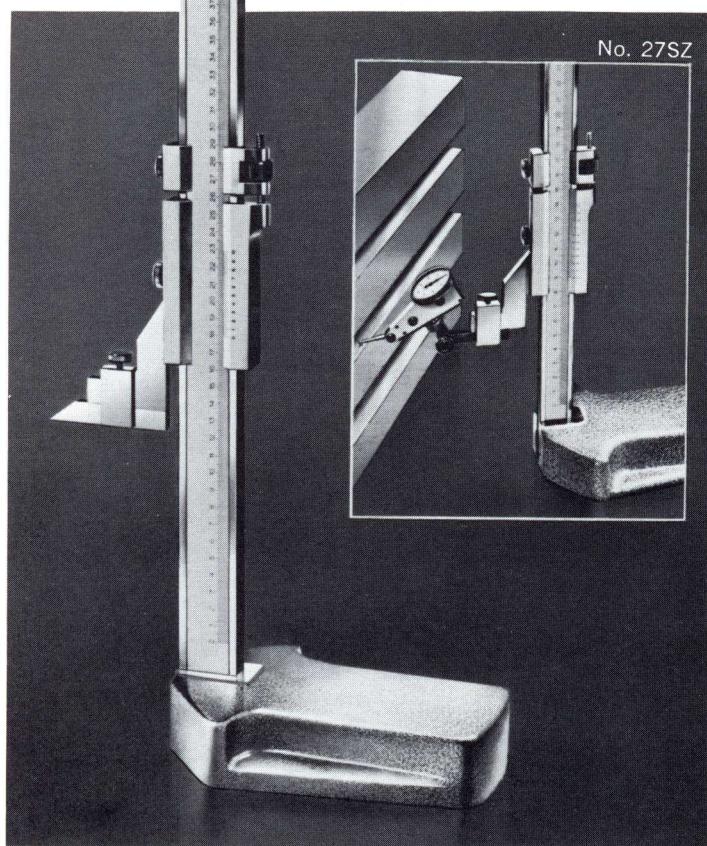
No. 27SZ, reading in .001"

Measuring range:	12"	20"	30"
Cross section of beam	$\frac{7}{8} \times 1\frac{1}{4}''$	$1\frac{3}{8} \times 1\frac{1}{2}''$	$1\frac{3}{8} \times 1\frac{1}{2}''$
Size of base	$5\frac{3}{4} \times 4\frac{1}{2}''$	$7\frac{1}{2} \times 5\frac{5}{8}''$	$7\frac{1}{2} \times 5\frac{5}{8}''$
Weight	6 lbs.	16 lbs.	18 lbs.

Black finished hardwood cases optionally available.

METRIC graduations available.

**No. 27SP Indicator Holder** for mounting of Universal Test Indicator "Puppitast" No. 800SZ (described on page 16). See insert.



## No. 21Z Precision Vernier Calipers

Made of steel, hardened throughout. Faces precision ground and lapped to a high polish. The bar is accurately ground and assures parallelism of the jaws over the entire range. Adjustable bronze spring gib permits simple adjustment of slide. The outsides of the jaws are radiused for inside measurements. Micrometer screw for fine adjustment. The open slide which carries the vernier gives an unobstructed view of the main scale.

The graduation lines are sharp-edged and deeply cut, clearly readable with the unaided eye. The numbers are engraved. Reading in .001".

## No. 21NZ Super Vernier Calipers

They resemble in design the Precision Vernier Calipers #21Z but offer these additional features:

**Stainless steel.**

**Satin chromed scales and verniers**, permitting easy reading and eliminating glare

Recessed Main Scale (PATENTED), protecting graduation lines from damage and scratches when moving slide

Raised guiding edges make the movements of the slide soft and smooth

Hardened throughout, minimizing wear.

Readings in .001".

### Specifications:

No. 21Z and 21NZ for readings in .001"

Measuring range	8"	10"	12"	20"	30"	40"
Length of jaws	$2\frac{3}{8}''$	$2\frac{3}{4}''$	$2\frac{3}{4}''$	$3\frac{1}{8}''$	4"	$4\frac{3}{4}''$

Black finished hardwood cases are optionally available.

METRIC graduations available.

Mahr

## VERNIER CALIPERS

## No. 16N MAHR Super Vernier Caliper

Made to the **highest standards** of accuracy. The measuring faces are precision ground, lapped to a high polish and checked for planeness against an optical flat.

A radically **NEW** raised edge design gives full and lasting protection to the **dull-chrome** finished scales, the raised edges acting as a guideway for the vernier scale.

Made of special **STAINLESS STEEL**, making it rustproof. Hardened throughout. Double length vernier reading in  $1/1000"$  for faster, more accurate reading. The recessed graduation lines of scale and vernier are produced on precision graduating machines, not by means of photographic printing process. The numbers are engraved. Two graduations on each tool with choice of inch and millimeter as specified below.

## Specifications:

MAHR Super Vernier Caliper

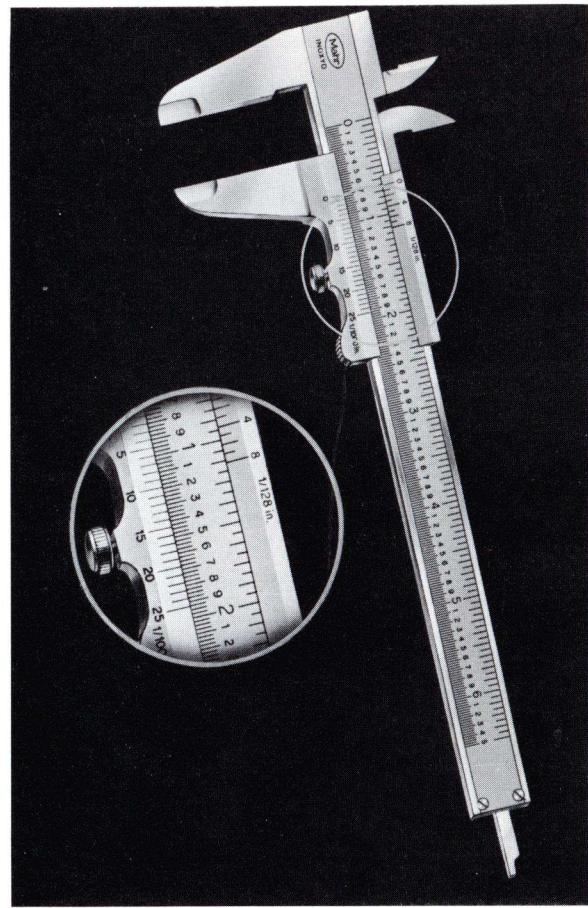
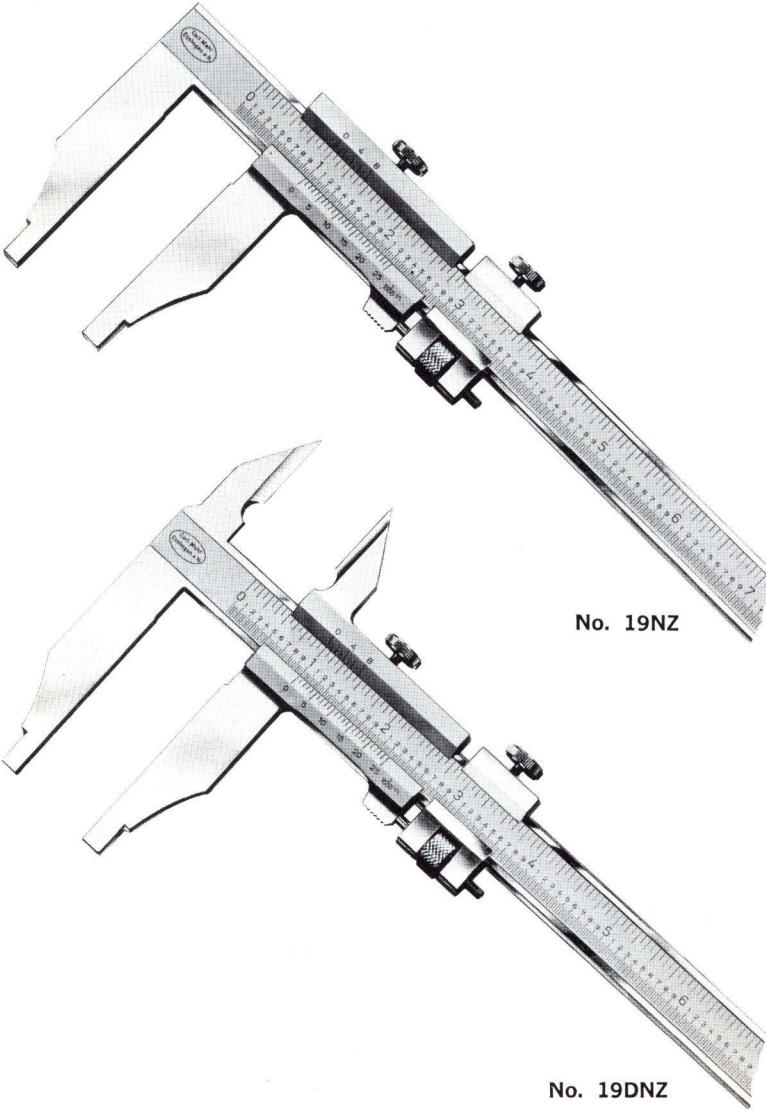
#16NZ      #16NZM

Length of scale       $6\frac{1}{2}"$   
 Measuring range       $5\frac{5}{16}"$   
 reading on lower scale       $1/1000"$   
 reading on upper scale       $1/128"$

$6\frac{1}{2}"$   
 $5\frac{5}{16}"$   
 $1/1000"$   
 $1/20$  mm

including formfit clear plastic case.

Optionally available: Leather pocket  
 Velvet lined leatherette case



## No. 19N Toolmaker Vernier Caliper

Made of **stainless steel**, hardened throughout, with micrometer adjustment, guaranteed accurate measurements to  $.001"$ .

**Dull chrome faced** main and vernier scales for easy reading. Extra long vernier. Machine divided graduations. A radically new raised edge design to give full and lasting protection to this surface—the raised edges acting as guideway for the vernier scale.

## Specifications:

No. 19NZ Toolmaker Caliper, with micrometer adjustment

No. 19DNZ Toolmaker Caliper, with micrometer adjustment and equipped with knife edges for measuring root, threads and for dividing.

Measuring capacity:      7"      9"      11"      20"      30"      40"

Length of jaws:       $2\frac{5}{16}$       3"       $3\frac{1}{16}$ "      6"      6"      6"

Optionally available: Black hardwood cases for same.

GRADUATIONS:  $1/1000"$  on lower scale  
 $1/128"$  on upper scale

METRIC graduations available.

## Also available:

No. 17 Vernier Calipers (not illustrated) without knife edge blades.

No. 17D Vernier Calipers, with hardened knife edge blades and scriber points.

All Steel. One piece bar and jaw. Reading:  
 lower scale  $1/1000"$       upper scale  $1/128"$ Without micrometer adjustment: 8" 10" 12" Measuring Range  
 With micrometer adjustment: 20" 30" 40" 60" 80" Measuring Range.

METRIC graduations available.

Mahr

# MAGNETIC V-BLOCK, HARDENED V-BLOCK

## No. 107M Permanent Magnetic V-Block

For cylindrical and plane work, with on- and off-switch.

Suitable for many purposes in toolmaking and inspection for measuring and layout work in quality control and toolroom.

Three magnetic surfaces: Top and bottom each with 90° V-angle and end surface opposite from switch. (When turned "on", all three magnetic surfaces are activated simultaneously.)

ACCURACY for flatness, parallelism and squareness is within .0002".

Holding power approximately 165 to 220 lbs.

Ideal for work which requires most accurate positioning, as for instance in the setting up of targets in autocollimation or in precision grinding, etc.

### Specifications: No. 107M

Clamping diameter range .....	3/16" to 2 1/2"
Length .....	4"
Height .....	3 3/4"
Width .....	2 3/4"
Magnetic pull on plane surfaces approximately .....	220 lbs.
Magnetic pull on V-surfaces approximately .....	165 lbs.

Including black finished wooden case.

These V-Blocks are also available in matched pairs.



## No. 107S V-Blocks

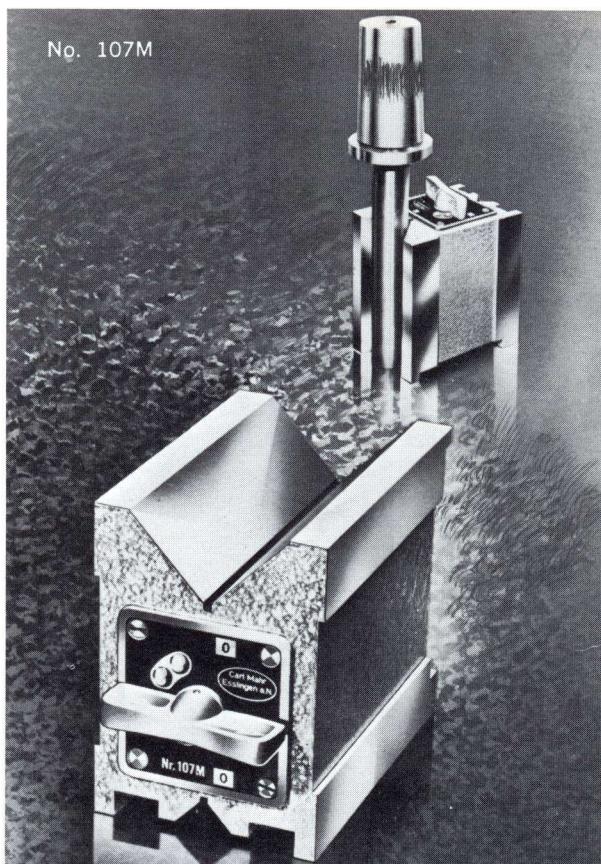
Made of steel, hardened and precision ground with clamp.

The V-Blocks have two V-angles of different size to take parts of varying dimensions. By means of the clamp the work can be held tight in the block. The accuracy for parallelism of the "V" with the bottom, its squareness to the two end faces, and the maximum permissible variation in height between two V-Blocks in a pair, is within .00012".

### Specifications: No. 107S

Clamping range .....	inches	3/16—1-3/16	1-3/16—2
Length .....	inches	2	3
Width and height .....	inches	1-9/16 x 1-9/16	2 3/8 x 2 3/8

These V-Blocks are also available in matched pairs.



## No. 107MH Permanent Magnetic V-Block

The above Permanent Magnetic V-Block is now available with **HARDENED** surfaces and V-angles.

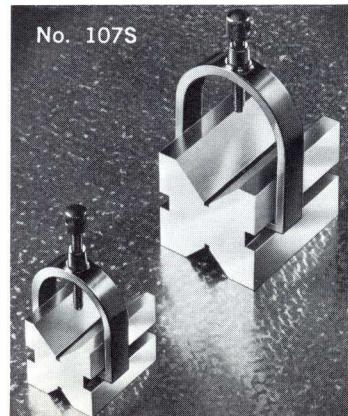
This novel Magnetic V-Block is equipped with **laminated hardened steel plates** on its V- and contact-surfaces, making them extremely wear resisting. Since these laminated hardened steel plates are relatively thin and closely mounted, the effectiveness of the on and off-permanent magnet, which is built into the soft iron magnet housing, is in no way diminished. Thus the measuring and holding device fulfills the important requirements of high magnetic pull and high wear resistance.

The dimensions and specifications of this hardened Magnetic V-Block are identical with those listed above for No. 107M.

### Specifications:

No. 107MH Permanent Magnetic V-Block with **HARDENED** holding surfaces and V-angles including black finished wooden case.

These V-Blocks are also available in matched pairs.



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## PRECISION LEVELS

## No. 108M PRECISION LEVEL

With longitudinal and traverse level vials with very accurately ground inverted V and plane faces.

The level bases are made of high grade seasoned castings, carefully aged by a special process, resulting in maximum wear resistance. Accurately ground on the bearing surface. Greatest care has been taken to provide strain-free mounting of the ether-filled precision ground and polished hard glass vials, assuring stability of the positioning of the vials.

## Specifications:

Length	6 1/4"	8"	10"	12"
Width	1 3/4"	2"	2 1/4"	2 1/2"

Sensitivity of the longitudinal level vial:

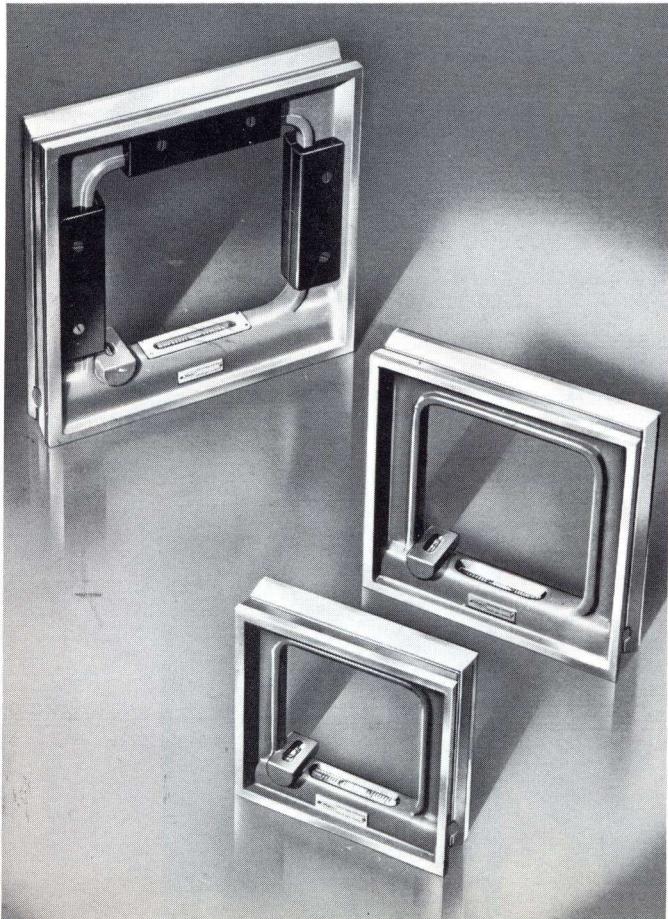
No. 108Ma 1 scale reading = .001" per foot  
 No. 108Mb 1 scale reading = .0005" per foot  
 No. 108Mc 1 scale reading = .00025" per foot

Furnished with Wooden Case.

METRIC scales available.

## Note:

All No. 108Mc HIGH PRECISION LEVELS having a sensitivity of .00025" per ft. require constant temperature of 68° F, greatest cleanliness, thermal insulation against heat transfer from the hand and body, protection from drafts and careful handling. Their frames as well as the level vials are protected against heat transfer by thermally insulated handles.



## No. 108R PRECISION FRAME LEVEL

With longitudinal and traverse level vials with three V-faces and one plane face, all faces most accurately ground.

The level frames are made of high grade seasoned castings, carefully aged by a special process, resulting in maximum wear resistance. Accurately ground on the bearing surface. Greatest care has been taken to provide strain-free mounting of the ether-filled precision ground and polished hard glass vials, assuring stability of the positioning of the vials.

## Specifications:

Length of one side	6"	8"	10"
Width	1 3/8"	1 1/2"	1 3/4"

Sensitivity of longitudinal vials:

No. 108Ra 1 scale reading = .001" per foot  
 No. 108Rb 1 scale reading = .0005" per foot  
 No. 108Rc 1 scale reading = .00025" per foot

METRIC scales available. Furnished with Wooden Case.

## Note:

All No. 108Rc HIGH PRECISION LEVELS having a sensitivity of .00025" per foot require constant temperature of 68° F, greatest cleanliness, thermal insulation against heat transfer from the hand and body, protection from drafts and careful handling. Their frames as well as the level vials are protected against heat transfer by thermally insulated handles.



# STEEL SQUARES

## Hardened Squares

Squares 105 Y and 105 Z are carefully hardened. All faces and edges are precision ground and adjusted. These squares are extremely valuable both in workshop and inspection room.

### No. 105 Z. Hardened Squares with thin blade and wide beam

for accuracy see specifications below

Edges ground and adjusted to very high accuracy  
Flats precisely ground

Blade length inches	3x2	4x2 $\frac{3}{4}$	6x4	8x5
	10x6 $\frac{1}{2}$	11 $\frac{3}{4}$ x8	19 $\frac{3}{4}$ x13	

### No. 105 Y. Hardened Squares with Bevelled Edges

stainless steel

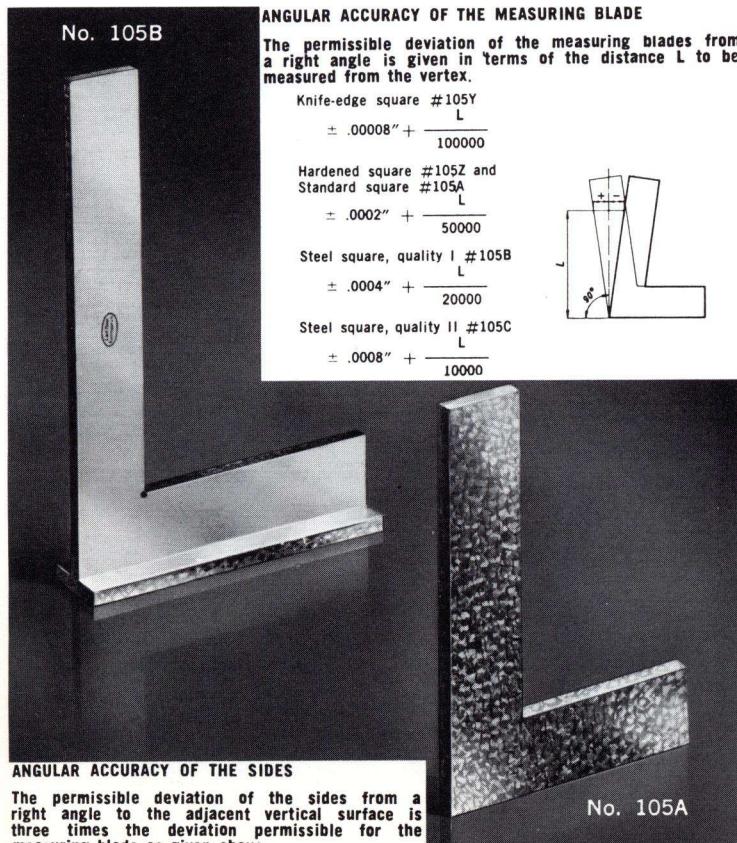
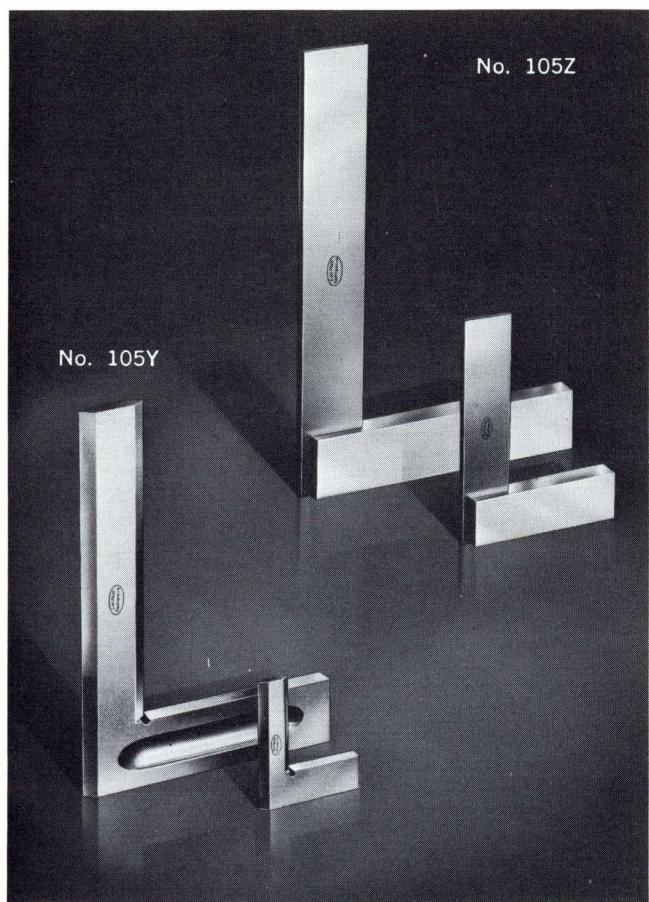
for accuracy see specifications below

Edges ground and adjusted to very high accuracy  
Flats precisely ground

The short blade is grooved for holding

Blade length inches	2x1 $\frac{1}{2}$	3x2	4x2 $\frac{3}{4}$	6x4
	8x5	11 $\frac{3}{4}$ x8		

These squares are furnished in wooden cases.



### No. 105 A. Standard Squares\*

Accuracy see specifications

Scraped all over. All faces absolutely parallel. Finest quality high accuracy inspection tools.

Length of blades inches	4x2 $\frac{3}{4}$	6x4	8x5	10x6 $\frac{1}{2}$
	11 $\frac{3}{4}$ x8	19 $\frac{3}{4}$ x13	29 $\frac{1}{2}$ x19 $\frac{3}{4}$	39 $\frac{1}{2}$ x26

### No. 105 B. Steel Squares\*

Quality I, see specifications

Edges precisely scraped, flats carefully finished. Highly recommended for exact work and inspection.

Length of blades inches	4x2 $\frac{3}{4}$	6x4	8x5	10x6 $\frac{1}{2}$
	11 $\frac{3}{4}$ x8	19 $\frac{3}{4}$ x13	29 $\frac{1}{2}$ x19 $\frac{3}{4}$	39 $\frac{1}{2}$ x26

### No. 105 C. Steel Squares\*

Quality II, see specifications

Edges ground accurately, flats carefully finished. General workshop square.

Length of blades inches	4x2 $\frac{3}{4}$	6x4	8x5
	10x6 $\frac{1}{2}$	11 $\frac{3}{4}$ x7	19 $\frac{3}{4}$ x10
	29 $\frac{1}{2}$ x14 $\frac{3}{4}$	39 $\frac{1}{2}$ x19 $\frac{3}{4}$	59x29 $\frac{1}{2}$

\*All squares can be furnished with or without flange.

Furnished without case.

Mahr

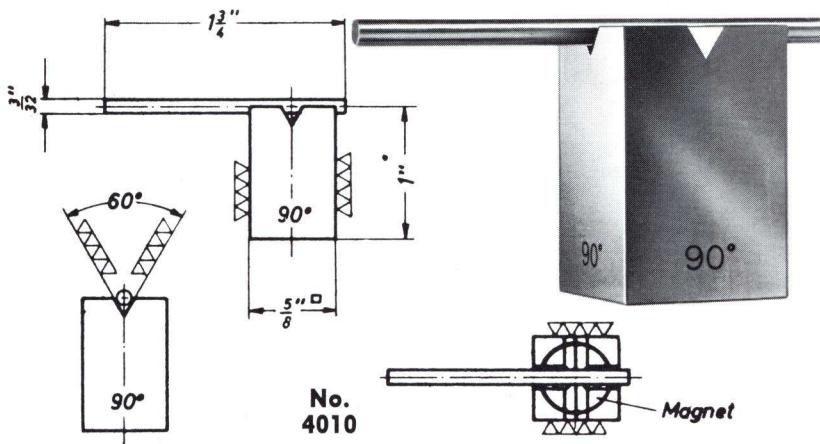
# CYLINDRICAL SQUARE, MAGNE SQUARE, PRECISION V-BLOCK

## No. 107T Cylindrical Square

MAHR cylindrical squares are made of hardened steel.  
Angular accuracy  $\pm .000028" + \frac{H \text{ (height)}}{300000}$

Cylindrical squares, used on cast iron or granite surface plates, provide one of the most reliable 90° reference standards available to industry today. Work may be placed against the periphery and sighted or the cylindrical square may be used for transfer type inspection.

Height	6"	12"	20"	28"
Diameter	3"	4"	6"	8"
Weight:	11	42	80	160 lbs.



### EXTREMELY ACCURATE

Angular Accuracy within .0002" on 1 1/16"  
Length of Measuring Blade Parallelism  
within .000040" between 2 opposing sides.

## No. 4010 Magne Square

Highest Precision Steel Square with magnetic V-angles.

An excellent aid for angular measurements in tool-making.

The measuring blade is connected to the beam through magnetic adherence. The magnetic pull is effective over the entire length of the beam surface. The blade has a round cross section.

The extreme accuracy offers a great variety of uses. Ideal for aligning a mirror in an optical projector by focusing the shadow of the beam. When employing optical projectors and toolmaker microscopes, delicate pieces of work may be held by the magnetic force of the square, avoiding expensive holding fixtures.

## V-Block No. 107V

For checking cylindrical work for diameter, out-of-round and taper.

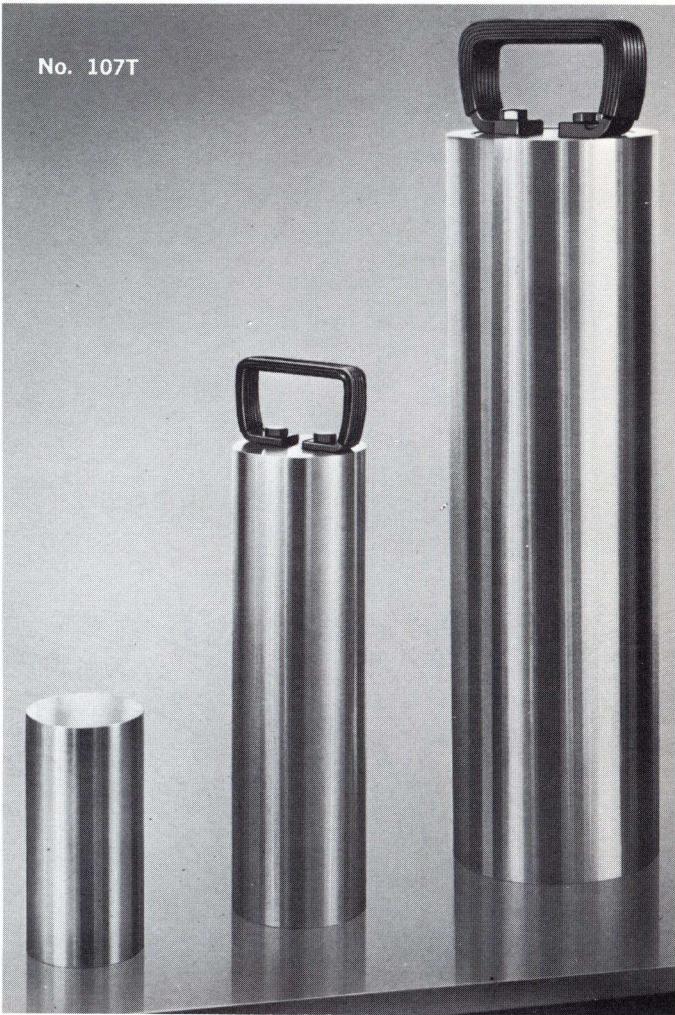
Carefully hardened, tempered, precision ground and lapped. Parallelism of the "V" to base and difference of height of V-blocks when furnished in matched pairs, accurate within .000080".

Dimensions .....  $1\frac{1}{16}" \times 1\frac{1}{16}" \times 1\frac{1}{16}"$

V-Angle ..... 108°

Range of diameters accommodated ..... .080"—1"

These V-Blocks are also available in matched pairs.



Mahr

# SINE BAR, BEVEL PROTRACTOR AND STRAIGHT EDGE

## No. 106U Universal Bevel Protractor

For parallaxfree readings, stainless steel, scale and vernier satin chrome finished.

This Bevel Protractor may be set to any angle. The vernier disc and the movable blade may be locked by knurled screw. The dial is provided with graduations covering the full circle of 360°. The vernier reads

$$1/12^\circ = 5'$$

Flush fitting of vernier and scale, both in the same plane, eliminates reading errors caused by parallax and ensures exact alignment of matching lines on scale and vernier. Non-glare satin chrome finish of scale and vernier provide better reading in any light without eye strain.

Length of blade 6" 8" 12"

Black finished wooden case { optionally Extra Measuring Blade { available

### Accessories, Optionally Available

No. 106Ua Adjustable Magnifier (as illustrated) to fit Bevel Protractor.

No. 106Uv Base for holding the Universal Bevel Protractor. The bottom, plane face and V for cylindrical work, is accurately aligned with the clamp slot for the protractor.

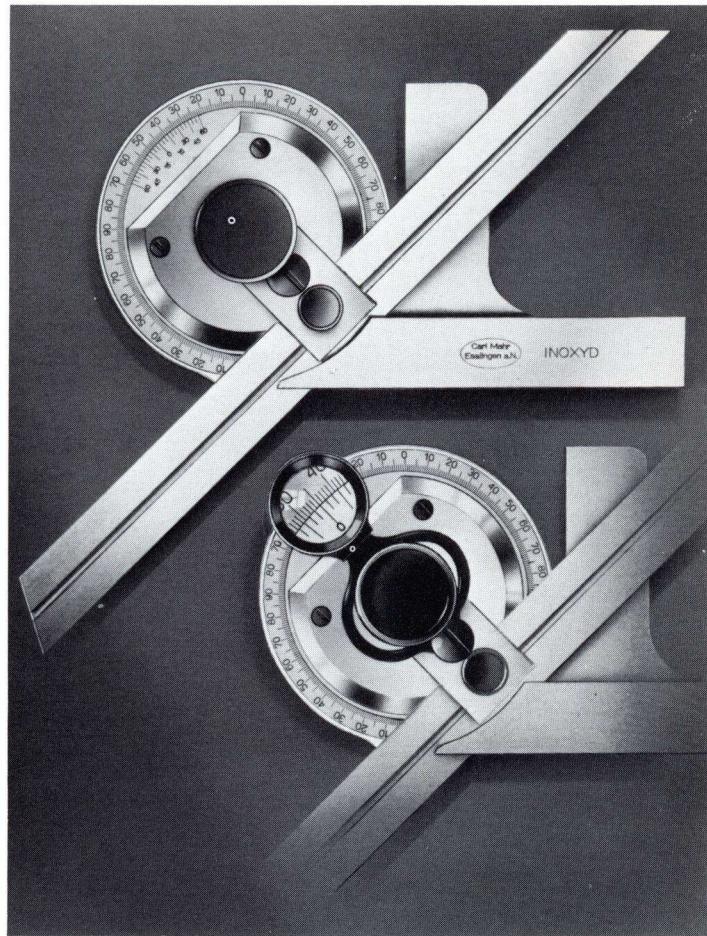
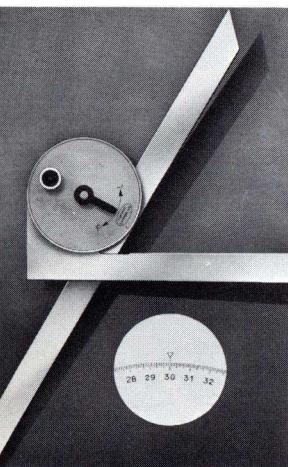
No. 106Uw Acute Angle Attachment for fast and accurate checking of small angles. Easily mounted on fixed side of protractor.

### No. 106W Optical Universal Bevel Protractor

Made of stainless steel and with dull chrome finished housing.

Capacity	360°
Reading	5 minutes of arc
Accuracy	± 5 seconds
Length of blade	6 or 12 inches

No. 106W



## No. 106X SINE BAR

For accurate setting or measuring of angles by means of gage blocks.

Hardened and ground and accurately lapped. The center to center distance of the measuring cylinders has been accurately adjusted to the length (L). The gage block length E for setting to an angle  $\alpha$  can be calculated with the formula:

$$E = L \cdot \sin \alpha$$

A removable flange on the bar provides a locating stop for the test piece.

Length (L) center to center distance between measuring cylinders	5"	10"
diameter of measuring cylinders	3/4"	3/4"
Entire length	6"	11"
width	1 1/16"	1 1/16"

Black finished hardwood case optionally available

METRIC version available.

**ACCURACY:** Within .000010" per inch of length  
Parallelism within .000025"

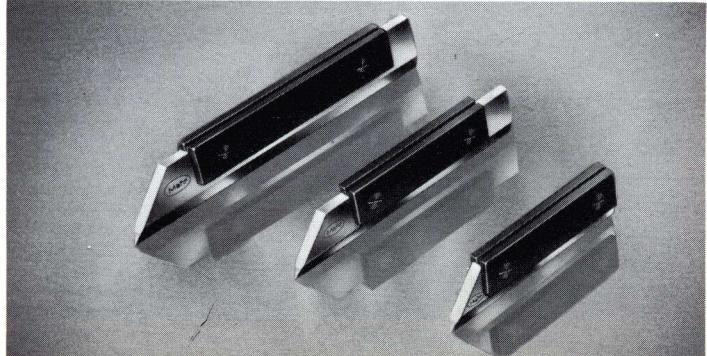
## No. 104H TOOLMAKERS KNIFE EDGE — STRAIGHT EDGE

For testing of straight surfaces, where extreme accuracy is required. Made of case hardened steel, hardened, tempered and provided with a carefully ground knife-edge by means of which the slightest inaccuracy in the tested surfaces may be easily determined. The shape combines ease of handling and high resistance against deformation. Thermally insulated handles prevent heat transfer from the hands.

Length 3" 4" 5" 6" 8" 12" 20"

Black finished Wooden Case optionally available.

We recommend ordering these Knife Edges with case, to protect them from damage.



# FLANGE MICROMETER, GEAR TOOTH VERNIER

## No. 887 Disc or Flange Type Micrometer

extra rigid, satin-chrome-finished,  
with sensitive ratchet stop and clamping  
reading .0001"

### Measuring Range:

Inches .....	0-3 $\frac{3}{4}$	3 $\frac{3}{4}$ -1 $\frac{3}{4}$	1 $\frac{3}{4}$ -2 $\frac{3}{4}$	2 $\frac{3}{4}$ -3 $\frac{3}{4}$
.....	3 $\frac{3}{4}$ -4 $\frac{3}{4}$	4 $\frac{3}{4}$ -5 $\frac{3}{4}$	5 $\frac{3}{4}$ -6 $\frac{3}{4}$	6 $\frac{3}{4}$ -7 $\frac{3}{4}$

### Diameter of flange:

Up to measuring range 3 $\frac{3}{4}$ " = 1"

Above measuring range 3 $\frac{3}{4}$ " = 1 $\frac{1}{4}$ "

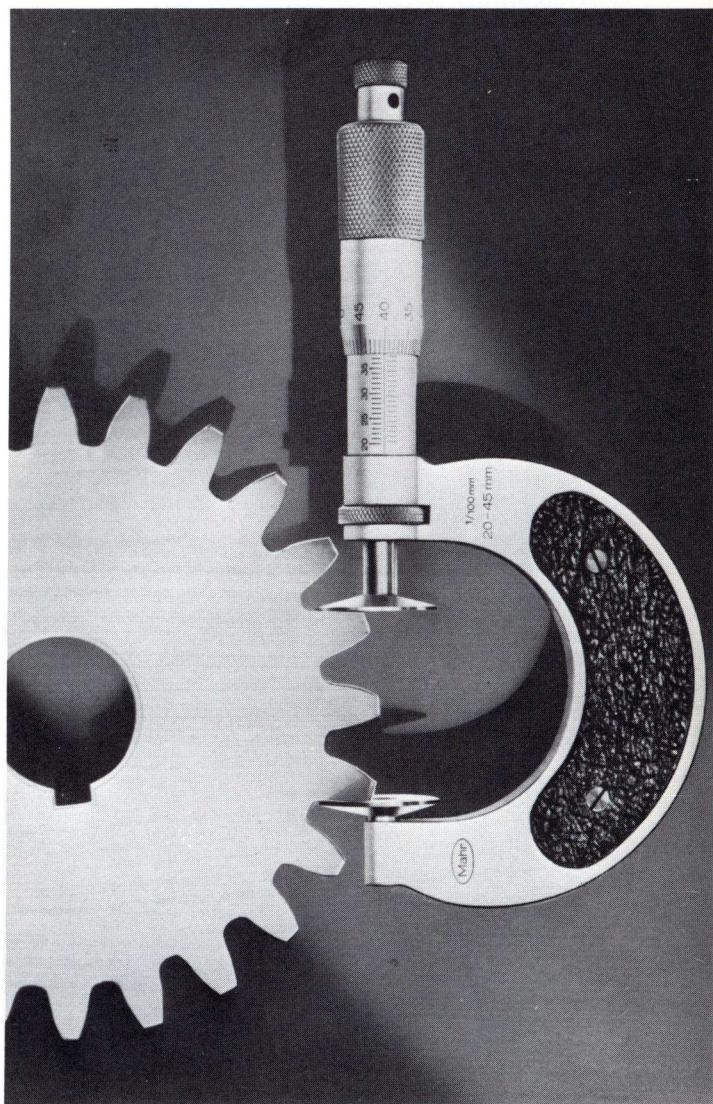
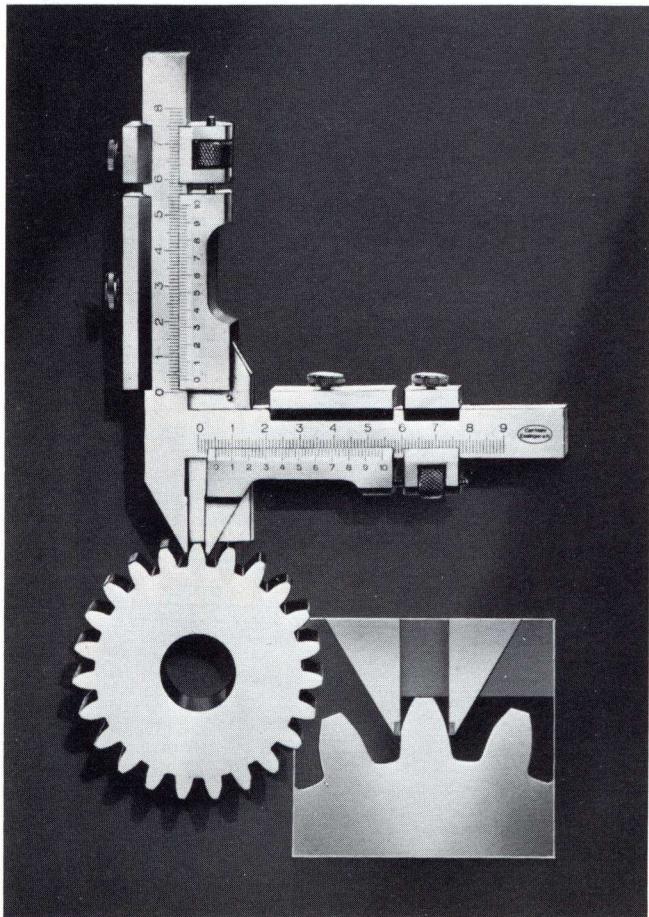
This micrometer is basically the same design as No. 40 S Super Micrometer, described on page 40 except that the measuring anvils are disc-shaped. Spindle and one disc are integral, while second disc replaces conventional micrometer anvil. They are hardened, ground and precision lapped true to each other.

This model has been designed for the accurate measuring of form tools, cutting edges, lands, hard-to-gauge places in general and especially for absolute measurement of tooth thickness on spur gears and helical gears. The extra-large discs make it possible to reach deep into recesses and to measure coarse-pitch gears.

**Setting Standards No. 887p** furnished optionally for all ranges.

Black hardwood cases are optional.

METRIC sizes available.



## No. 26 Gear Tooth Vernier Calipers

For measuring of tooth thickness of spur gears, helical gears and bevel gears.

All steel, measuring jaws carefully hardened and precision ground. Long slides with accurate guide ways having adjustable bronze gibbs, guaranteeing highest measuring accuracy.

**Measuring edges have tungsten carbide faces.**

**Graduation 1/50 mm or 1/1000".**

This Vernier Caliper is designed for measuring tooth thickness. The vertical slide sets the height of the tooth from crest to pitch circle and the horizontal slide measures the tooth thickness at the pitch circle.

**Measuring Range for modul: 1-20 or D. P.: 25-1 $\frac{1}{4}$**

The Vernier Caliper in range 1-20 modul or D. P. 25-1 $\frac{1}{4}$  has extra long Verniers, which greatly facilitate readings of 1/50 mm or 1/1000" (refer to illustration). Black hardwood cases are optional.

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# GEAR TESTING EQUIPMENT AND OTHER MAHR PRODUCTS

## No. 867 Base Pitch Measuring Instrument

For spur gears and gear toothracks with straight and helical teeth, reading in .000050", measuring range: module 0.7-18 or DP 36-1½.

With the Base Pitch Measuring Instrument the base pitch error can be determined and the checking of the uniformity of the base pitch among all teeth can be simply and most accurately performed. Being portable, the instrument may be successfully used for inspecting gears **still mounted on the production machine**. The Precision Comparator can be interchanged with other models.

### Specifications:

No. 867 Base Pitch Measuring Instrument, reading in .000050", range 36-1½ D.P.

No. 867a Interchangeable Measuring Anvils

TYPE	a1	a2	a3	a4
Module	.7-2	Over 2-5	Over 5-10	Over 10-18
D.P.	36-13	12-5½	5-2¾	2½-1½

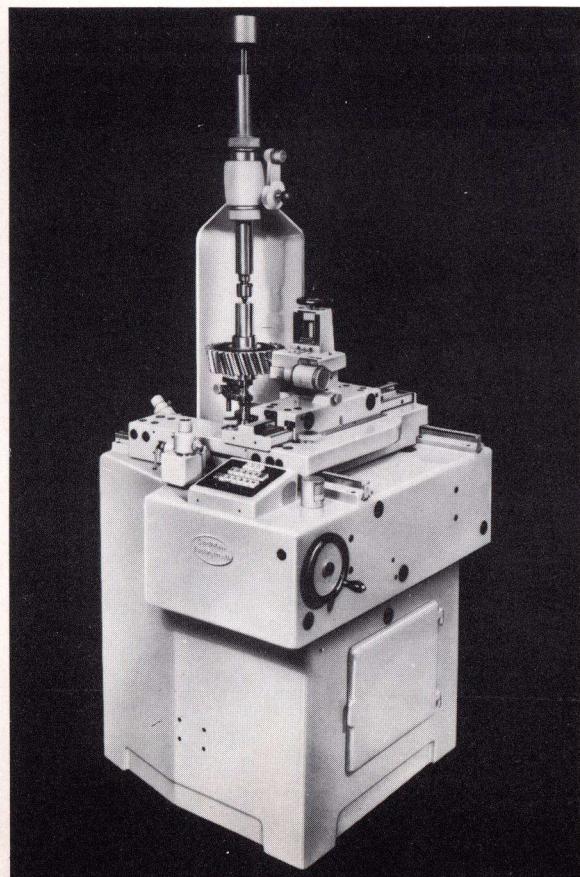
No. 867b Fixed Setting Gages

No. 867c Variable Setting Gages

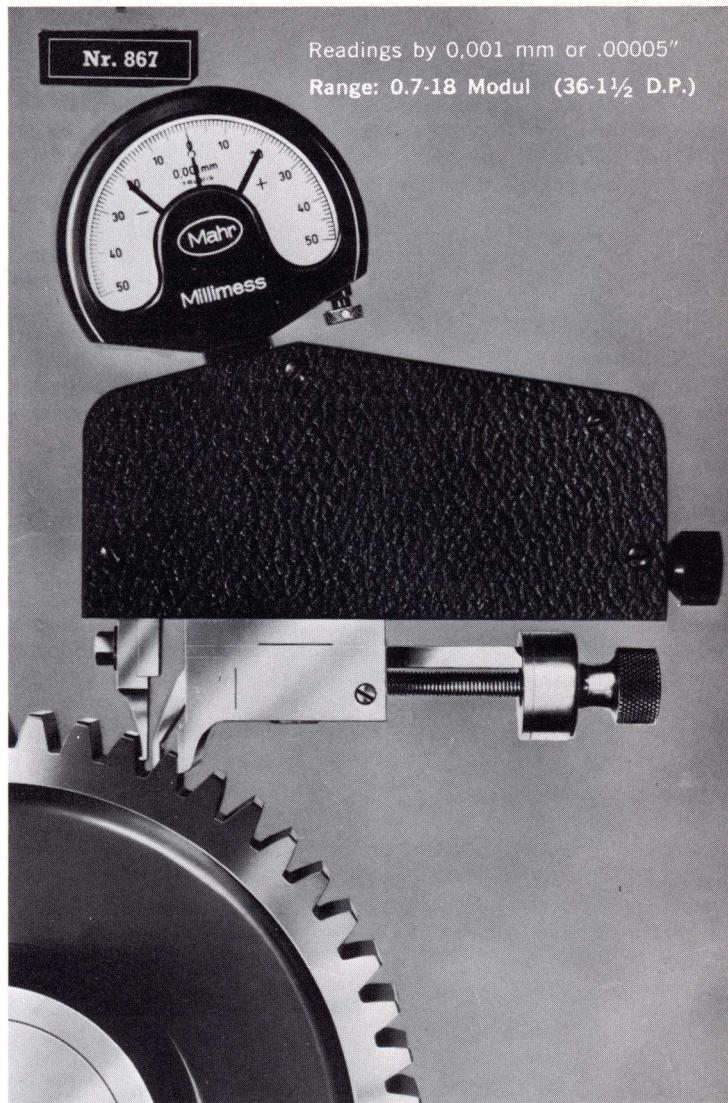
OPTIONAL

ACCESSORIES:

Gage Block Holders  
No. 867t Measuring Stand  
Request complete quotation.



No. 891 Measuring Machine for involute and helix angle.



## Other MAHR Products

### MAHR Gear Testing Equipment

- No. 889 Involute Measuring Machine with fixed base circle discs.
- No. 890 Involute Measuring Machine with infinitely variable optical base circle setting.
- No. 891 Measuring Machine for involute and helix angle.
- No. 892 Universal Gear Tester.
- No. 894 Workshop Gear Rolling Tester
- No. 895 Gear Rolling Tester
- No. 895g Master Gears

### Taper Measuring Machine

For outside and inside tapers.

### Hydraulic Expanding Mandrels

Hydraulically operated for precision mounting of gears, other workpieces and tools.

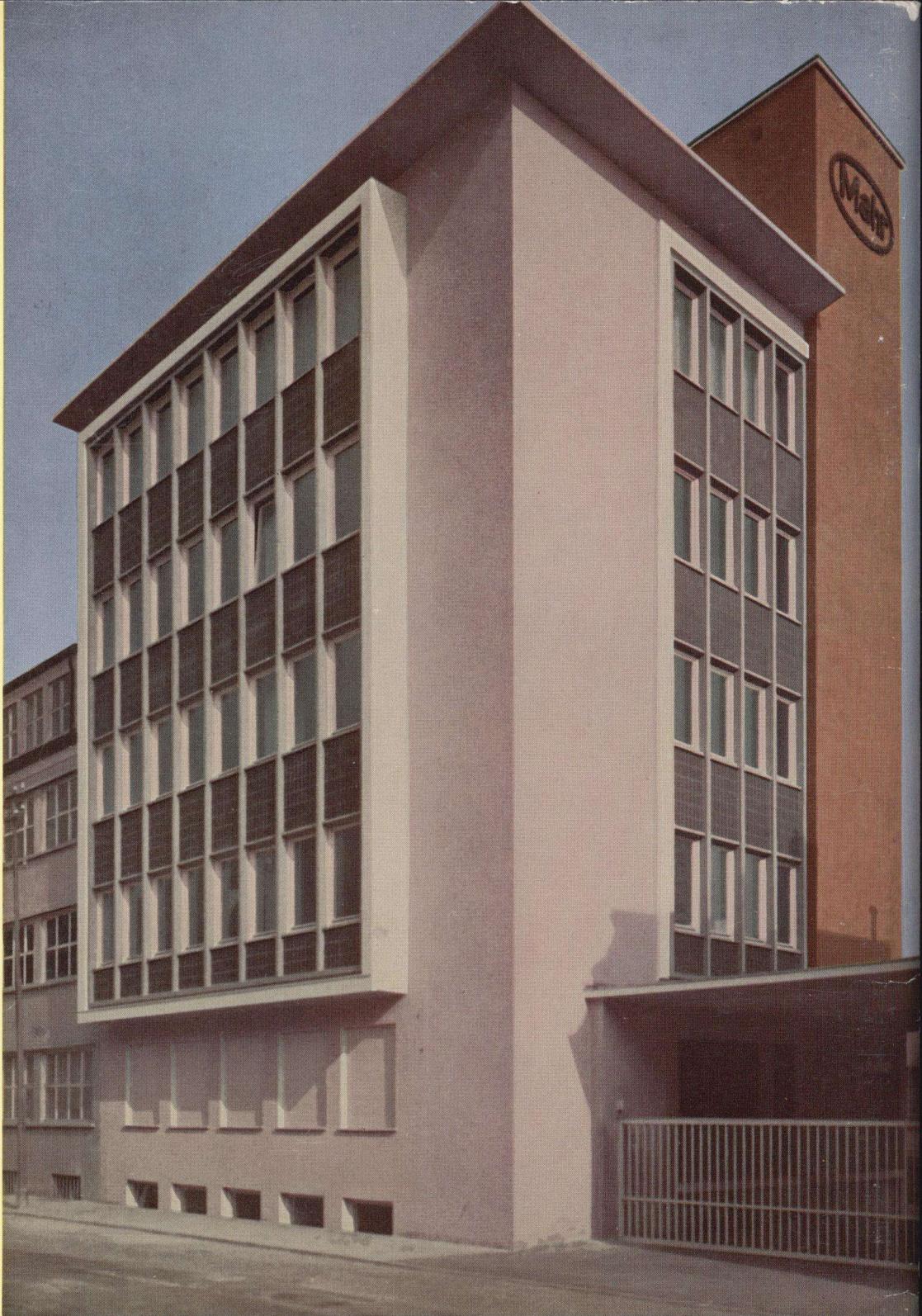
### Gage Blocks

In Millimeter sizes only.

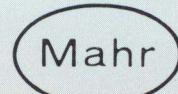
Specialized literature on request.

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*Precision Measuring Instruments*

